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Training Industrial Metallurgists

New Course Designed to Fill a Gap Not Occupied by Previous Curricula—Four-Year and Five-Year Men

BY H. B. DIRKS*

MICHIGAN State College is endeavoring to meet a new demand in the engineering profession by the establishment of a curriculum in industrial metallurgy, that field of metallurgy which emphasizes the uses of metals and alloys rather than their production.

It is recognized by most authorities that the fundamentals of engineering are of primary importance in an engineering curriculum and that specialization in the four-year course should be discouraged. But the demand for some special work in civil, mechanical, electrical, mining and chemical engineering is generally accepted as essential by the industries and colleges alike.

During the last 20 years a new group of engineers has grown up in the industries whose work is not included in any of the five above-mentioned curricula. This group is made up of the industrial metallurgists whose work it is to specify the metals and alloys that are used for various purposes. The industrial metallurgist also controls the inspection of the metals that go into the important parts of our modern high-duty machinery and common necessities. These engineers are undoubtedly specialists and have been trained by a long, painstaking and costly process by the industries.

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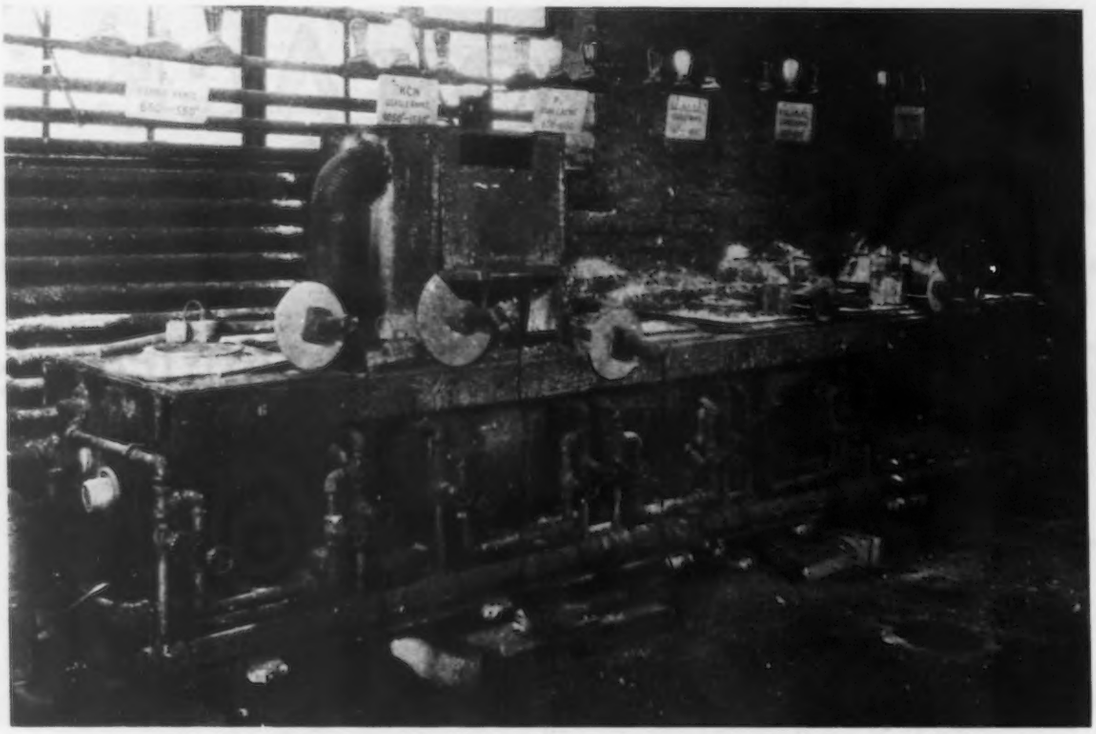
Need for Industrial Metallurgists

The automotive, aeronautic, steel and allied industries are particularly in need of men who are well trained in industrial metallurgy. Men who can correlate mechanical engineering, especially advanced design, with the science of metals are indispensable to these industries, yet very rare.

The proposed course in industrial metallurgy was developed after considerable study of the demands which the industries make upon metallurgists. Comparisons were made between the demand and the various metallurgy curricula offered throughout the country; no curriculum seemed to offer the necessary combination of mechanical engineering and the science of metals.

Michigan State College is uniquely located to offer such a training in metallurgy. It is in the center of the automotive industry, of which there are large rep-

Pouring a Mold in the Foundry Is Part of the Practical Side of the Training



Pot Furnaces in the Metallurgical Laboratory, Where the Behavior of Metals May Be Observed Through All Temperature Ranges Up to Melting or Above

resentative establishments located within five miles of the campus, and which afford plenty of opportunity for intimate study by the students. The problem resolved itself simply into the rearrangement of the subject matter already offered at the college into an industrial metallurgy curriculum.

How the Course Shapes Up

For the first two years the work is identical with the first two years of the mechanical engineering curriculum. Then the industrial metallurgy course is offered as an option, especially to the mechanical engineering juniors. But it may be elected by any other junior engineer, subject to faculty approval. The four-year course leads to the degree of B.S.

Facilities afforded to the students are very complete in every line of metallurgical study and research. Each metallurgical course except metallurgy of non-

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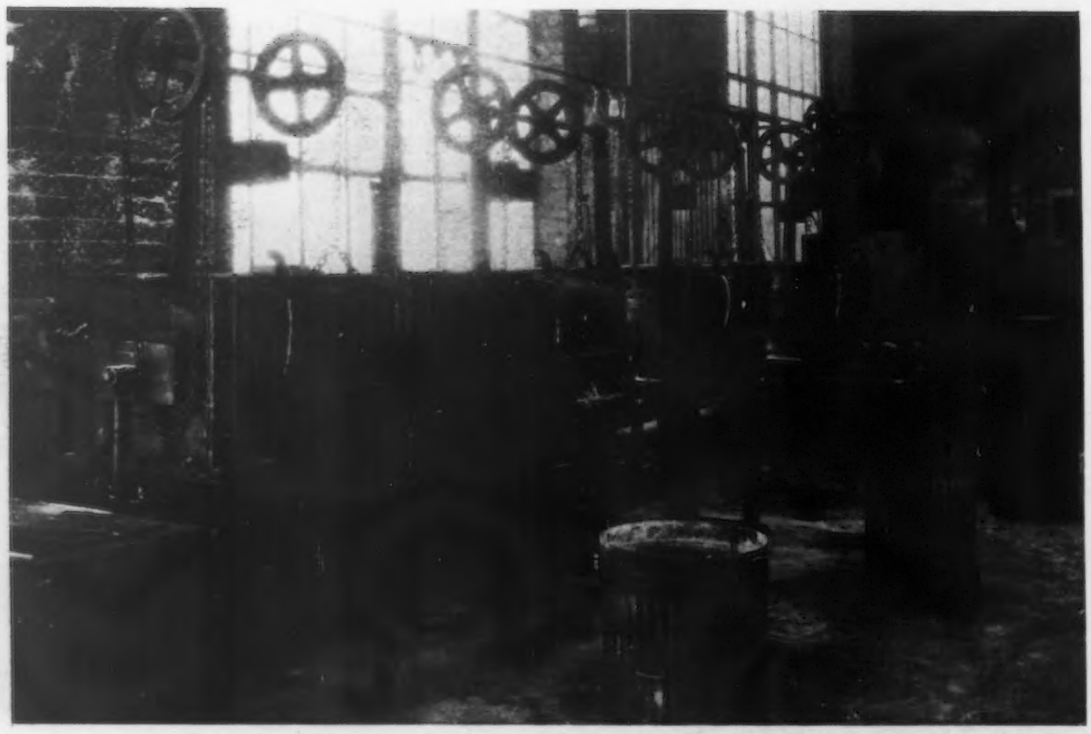

Gas-Fired Hearth Furnaces in Metallurgical Laboratory, for Heat Treatment and Other Purposes

Figuring Efficiency of Steel Mills

Method of Calculating for Rolling—Allowing for Lost Time, Cobbles, Changing Sections, Etc.

BY FRED C. SMITH*

A PROBLEM which frequently occurs in connection with rolling mill practice is that of comparing the relative efficiency of different mills and of performances of the same mill at different times. Obviously mere comparisons of tonnage produced are not sufficient for this purpose. Nor does the amount of time lost in performance give any indication of the efficiency of the mill. The most practical method is to compare actual production with a theoretical maximum. If this comparison is made on the basis of actual rolling time, time lost due to unavoidable causes having been deducted, we have a measure of the true efficiency of the mill.

Suppose the following data (a) are available for a given run:

Example I—Collar diameter of finishing roll, 12⅛ in. = 1.0104 ft.
Product: round bars.
Diameter of bars, ½ in. = 0.0417 ft.
Weight produced, 201,060 lb.
Total available time, 480 min.
Delays, 48 min.
Speed of finishing roll, 372.9 r.p.m.

What is the efficiency of the mill for this run?

The maximum production of a theoretically perfect performance is calculated as follows: The pitch diameter, in lineal feet, of any roll is $P\ D = C\ D - 0.7071\ S$, where $C\ D$ is the collar diameter of the roll in feet and S is the largest diameter of the finished product, measured in a plane perpendicular to the axis of the roll. In the given instance,

$$P\ D = 1.0104 - (0.0417 \times 0.7071) = 0.9809 \text{ ft.}$$

Multiplying the pitch diameter by π gives the pitch circumference of the roll, which is equivalent to the amount of the product, in lineal feet, delivered per revolution, i.e.:

(a) The data used in this and the following examples are taken from actual performance of a rolling mill.

$0.9809 \times 3.1416 = 3.0816$ ft., pitch circumference.

The speed of the roll, in revolutions per minute, times the pitch circumference gives the possible delivery in lineal feet per minute:

$$3.0816 \times 372.9 = 1149.1 \text{ ft. per min.}$$

Multiplying this figure by the actual rolling time in minutes gives the maximum possible production for the given period:

$$(480 - 48) \times 1149.1 = 496{,}411 \text{ ft.}$$

This figure may be expressed in pounds by multiplying it by the weight per foot of the product—in this case, 0.668 lb. per ft. In this way we obtain a figure for perfect performance.

$496{,}411 \times 0.668 = 331{,}603$ lb., production under perfect conditions, with which may be compared the figure of actual production, 201,060 lb.

The coefficient of efficiency may then be computed by dividing the actual production by the theoretical. Expressed in per cent, the result is:

$$201{,}060 \div 331{,}603 = 60.6 \text{ per cent.}$$

In this example, the coefficient of efficiency will be the same, regardless of whether we figure the efficiency in terms of weight or in terms of length rolled. In the latter case we reduce the actual production to feet by dividing it by the weight per foot of the product, and take the ratio between that figure and the figure in feet of the theoretical delivery.

$$201{,}060/0.668 \div 496{,}411 = 60.6 \text{ per cent.}$$

This coefficient will never equal 100 per cent because:

1.—There is always a certain amount of "slip" between the rolls and the bar.

2.—The rolling is not continuous. A time allowance must be made at the furnace for the longer time taken for a pass as the diameter decreases and the bar lengthens. This cannot be exactly estimated. Consequently there will be a gap between the end of one bar and the front of the following one.

Suppose that, instead of one size bar, two different sizes of the product are rolled in the same day. The following data are available:

Example II—Collar diameter of finishing roll, 12⅜ in.
⅝-in. rounds, 914,015 lb. in 1008 min.
⅜-in. rounds, 103,261 lb. in 432 min.
Total, 1,017,276 lb. in 1440 min.
Speed of finishing roll, 372.9 r.p.m.

Computing the theoretical productions as in Example I, we find that under perfect conditions there should be produced:

1,224,495 lb. of ⅝-in. rounds
192,010 lb. of ⅜-in. rounds

To find the coefficient of efficiency of the mill we add the theoretical production figures and divide the sum by the total production of both sizes.

$$1{,}017{,}276 \div 1{,}416{,}505 = 71.8 \text{ per cent.}$$

Measured in terms of feet delivered, instead of weight, the theoretical production is:

1,173,917 ft. of ⅝-in. rounds
510,667 ft. of ⅜-in. rounds

Total 1,684,584 ft.

The length actually produced, found by dividing the production of each size in pounds by the weight of the respective product per foot, is

876,333 ft. of ⅝-in. rounds
274,630 ft. of ⅜-in. rounds

Total 1,150,963 ft.

And the coefficient of efficiency is:

$$1{,}150{,}963 \div 1{,}684{,}684 = 68.3 \text{ per cent.}$$

Here is a difference of 3.5 per cent between the coefficient of efficiency calculated on the basis of weight and that calculated on the basis of feet delivered. Obviously one or both are in error. Obviously, also, the error arises from the fact that the figures are averages of two separate coefficients. The coefficients are rates, and the arithmetic average of rates is not mathematically a true average. This may be seen from a simple illustration.

A man drives an automobile one mile at the rate of 20 miles an hour and one mile at the rate of 30 miles an hour. What is his average speed? It is not 20 + 30 ÷ 2, or 25 miles an hour. Speed is expressed

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(*Concluded on page* 1828)

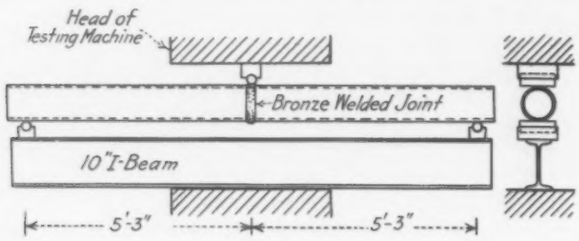
Bronze Joints in Cast Iron Pipe

Four Years' Service Experience Indicates Weaknesses in Butt Joints with Collar Welds—New "Shear-Vee" Design Proves Cheaper and Twice as Strong

BY T. C. FETHERSTON*

FOR several years, bronze-welded joints in cast iron pipe lines have interested the gas distribution industry. "Unaccounted-for gas" averages as much as 10 per cent of the make, and much of this is lost through leaky pipe joints. Since the bronze welded joint seemed to solve the leak problem, a number of such lines have been laid.

Early investigations were made of the "vee," the "collar" and the "combined vee and collar" joints by



Fixtures for Testing Twelve-Foot Lengths of Pipe in Bending

cutting strips from the welded pipe and pulling the pieces in a tension machine. Failure occurred in the cast iron adjacent to the bronze weld in all joints of the collar type, whereas the simple vee pulled apart along the bevel where bronze met the iron. Since the high shearing strength of bronze adhering to cast iron was known, and since all fractures with the collar type of joint occurred in the pipe itself, it was assumed that the collar joint was correct, and these early lines were laid by simply butting the squared pipe together and running a collar of bronze about the joint by means of oxy-acetylene welding.

Some breaks occurred during the winter months in some of the installations in the field. The trouble, at least in part, lay in the failure to provide for contraction in the line during cold weather, and to careless laying in a rough or undulating trench bottom. However, since fractures were usually located in the iron adjacent to the weld, it became evident that the joint had some influence. Because of the industrial importance, this matter was investigated by engineers of the United States Cast Iron Pipe & Foundry Co. and the Linde Air Products Co.

Joints Tested by Bending Pipe

A number of flexure tests were made on 12-ft. sections of full sized pipe, plain and jointed, as shown in the figure. In jointed samples the load was applied directly on the weld in order to produce the maximum bending moment and stress at that point.

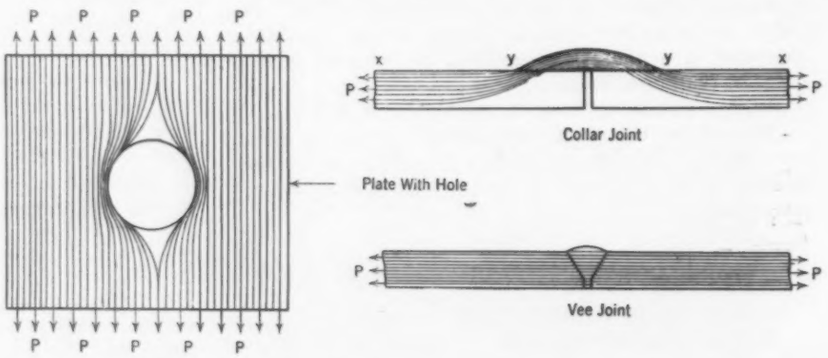
As shown by the results summarized in the table, the strength of the collar type joint in bending is found to be only about 55 per cent of the strength of the pipe itself, when deLavaud pipe is used, and only about 42 per cent when sand-cast pipe is used. Failure, in all cases, occurred through the cast iron pipe wall adjacent to the edge of the weld, as was typical of the failures in service. The collar type of joint apparently had a decided weakening effect on the pipe next to the bronze.

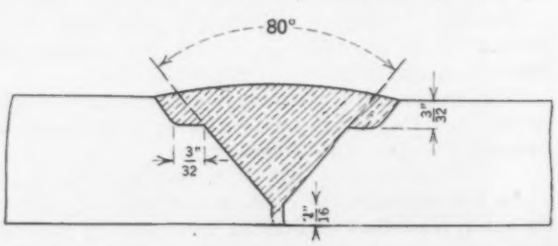
Numerous theories as to the cause of this weakness had been discussed at length, but investigation at the Union Carbide & Carbon Corporation Research Laboratories had shown that the welding heat does not affect the chemical or physical properties of the iron. Why, then, does failure take place in the pipe next to the bronze collar? The answer, as determined by this investigation, lies in the mechanical design of the joint; failure is due to a concentration of stress in the cast iron adjacent to the weld.

Stress Concentrations Under Collar

Stresses in any material under strain may be represented by a series of lines, each one tracing the location and direction of a portion of the total load. If the load is evenly distributed the lines would be equally spaced over the cross section. If uniform distribution is upset by any reason, the resulting stress concentrations would be shown by a scattering or crowding of the lines, as the case may be. As an illustration, consider a plate with a hole in it, subjected to a uniform load as in the figure. Through the solid part of the plate some distance away from the hole the stress lines are evenly spaced, but they must flow around the opening to transfer the stress around that section. There is consequently a bunching of the stress lines at the edges of the hole, indicating high stress concentration at these

Sketches Showing Stress Concentrations at and Near Conventional Joints





Design of Shear-Vee Bronze Weld Developing Full Strength of Centrifugally Cast Pipe

*Technical Publicity Department, Linde Air Products Co., New York.

points. Such facts have been proved by optical studies on transparent test specimens.

The figure also shows an approximate stress transfer diagram for the collar joint. It is immediately evident that a high concentration in stress exists at *Y* in the cast iron next to the bronze collar, and may be two or three times the stress in the pipe further away. Fractures therefore occur at relatively low average loads, and they are invariably at this point.

Failures in Vee Joints Due to Unannealed Machined Surfaces

The simple vee joint is much more efficient in accomplishing uniform stress transfer. Although this style was discarded in favor of the collar type as a result of early investigations, it is now known that those test failures were due to improper preparation of the ends of the pipe to be welded, rather than to the design of the joint.

When gray cast iron is machined, the finished surface exposes much graphite and graphite flakes, and such a surface is very difficult to "tin." Poor adhesion of the bronze welding rod results. However, it may be superficially decarbonized by a simple anneal at a bright red, after which the "tinning" action becomes almost automatic. This fact was not known to the early investigators, but it is now standard practice to sear or anneal the machined pipe ends at the foundry prior to welding.

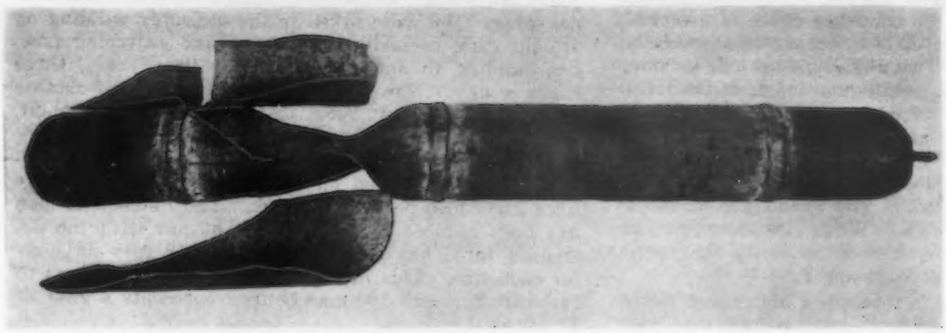
Vee type welds, applied to properly annealed beveled surfaces, are much stronger than the collar type, as proved by cross bend tests summarized in the table. Failures occurred in every case along the vee. Generally a fracture in deLavaud pipe showed a layer of cast iron adhering to the bronze at the bottom of the vee, along the inner part of the wall. At the outer part of the wall, the break followed the tinned surface of the bevel, leaving a very thin coating of bronze on this part of the pipe. Apparently the adhesive strength of bronze in tension was not quite equal to the high strength of DeLavaud iron. The joint was therefore strengthened by a shear area near the surface; the high adhesion of bronze to cast iron in shear thus assists the tensile adhesion along the walls of the vee. This "shear-vee" joint develops practically the full strength of the pipe (see the table). Fractures in bending occur in the cast iron at a figure equivalent to the strength of the continuous pipe.

Hydrostatic tests were made on bombs, made up as shown in the view. One required a pressure of 27,800 lb. per sq. in. and the other 24,500 lb. per sq. in. for fracture. These pressures agree closely with published data on the bursting strength of the pipe. Both bombs broke longitudinally, the bronze welds appearing unharmed.

Dimensions of Shear-Vee Joint

The shear-vee type of joint is a combined collar and vee joint, so modified that the weld metal lies within the plane of the pipe wall. There is no undue stress concentration or eccentricity. The most economical design for ease in laying and minimum cost is found to embody a 40-deg. bevel and a shear area about 3/32 in. from the outside of the pipe wall. This distance seems to be constant for almost all wall thicknesses of pipe. Since the bronze weld metal has an ultimate strength of at least 40,000 lb. per sq. in. (which is greater than the strength of the cast iron), it is merely necessary to make the weld equal to the thickness of the pipe wall. No thickening or reinforcement is required.

The shear-vee joint has other advantages over the collar type. When the joint is properly prepared, the weld is easier to make, since it is only necessary to fill the vee and shear area. When making collar welds considerable difficulty is encountered, especially by inexpert operators, in getting the right width and thickness of the bronze collar and in spacing it evenly over the abutting pipe ends. With the shear-vee joint, dimensions are controlled by the shape of the pipe ends. Less bronze is required. While it is more expensive to prepare and make than the low-cost vee joint, its total cost, including machining and annealing of the pipe ends at the foundry, is slightly less than that of the completed collar joint. Searing or annealing by means of the oxy-acetylene blowpipe should not be attempted, except when absolutely necessary, as it may easily be improperly done.



Bomb Made With Shear-Vee Joints, Before and After Hydraulic Test

Since failures from all causes in present collar-type bronze-welded cast iron pipe installations, which in most cases have not been carefully laid, have totaled less than 2 per cent of the number in service, it is confidently expected that the new type shear-vee joint, having 100 per cent additional strength, will eliminate practically all breaks in future lines. However, it must be remembered that welding converts the pipe sections into a continuous tube, which carries bending and temperature stresses which do not exist in bell and spigot pipe. Safety can be assured by exercising a reasonable amount of care in laying and by the effective placing of expansion joints, both of which problems have been investigated and data established.

Corrosion Resistance of Bronzed Joints

Reports of the committee on corrosion of the American Gas Association and the United States Bureau of Standards and inspection of joints in service for

four years have shown that the rate of corrosion in or near the joint is no greater than in the rest of the pipe. The bronze has a lower electrical resistance than any of the joints commonly used in cast iron pipe; hence it conducts any stray currents that may be traveling the line. A high-resistance joint causes the current to leave and reenter the line and causes electrolytic action.

With this shear-vee joint, which develops practically the full pipe strength, minimizes strains, has high resistance to corrosion and is leak-proof, it is expected that the maximum of service and long life will be obtained from cast iron pipe lines, provided only that reasonable care is exercised in the laying.

Flexure Tests on Cast Iron Pipe

	Modulus of Rupture Lb. per Sq. In. (Average)	Joint Efficiency Per Cent (Average)
6-In. deLavaud Cast Iron Pipe:		
Plain pipe	34,500	100
With collar type bronze weld.	19,000	55
With vee type bronze weld..	28,750	83
With shear-vee bronze weld.	32,950	96
6-in Sand Cast Iron Pipe:		
Plain pipe	27,170	100
With collar type bronze weld.	11,450	42
With vee type bronze weld..	21,500	79
With shear-vee bronze weld..	27,500	100

Carrying Engines on 1½-Mile Conveyor

Assembly Increased 23 Per Cent per 100 Man-Hours—Steady Flow of Motors in Buick Plant

A CHAIN-TYPE conveyor approximately 1½ miles in length, which is said to be the longest conveyor installed in any industrial plant, is being used by the Buick Motor Co., Flint, Mich., for taking motors from the motor test room, adjoining the motor assembly plant, to the car assembly plant. Starting near the floor of the motor test room, the conveyor rises to the roof level and is carried across the top of one building, through a covered bridge, across the street and over another building before reaching its destination. The conveyor has a capacity for carrying 600 motors at a time and moves at a speed of 10 ft. a min.

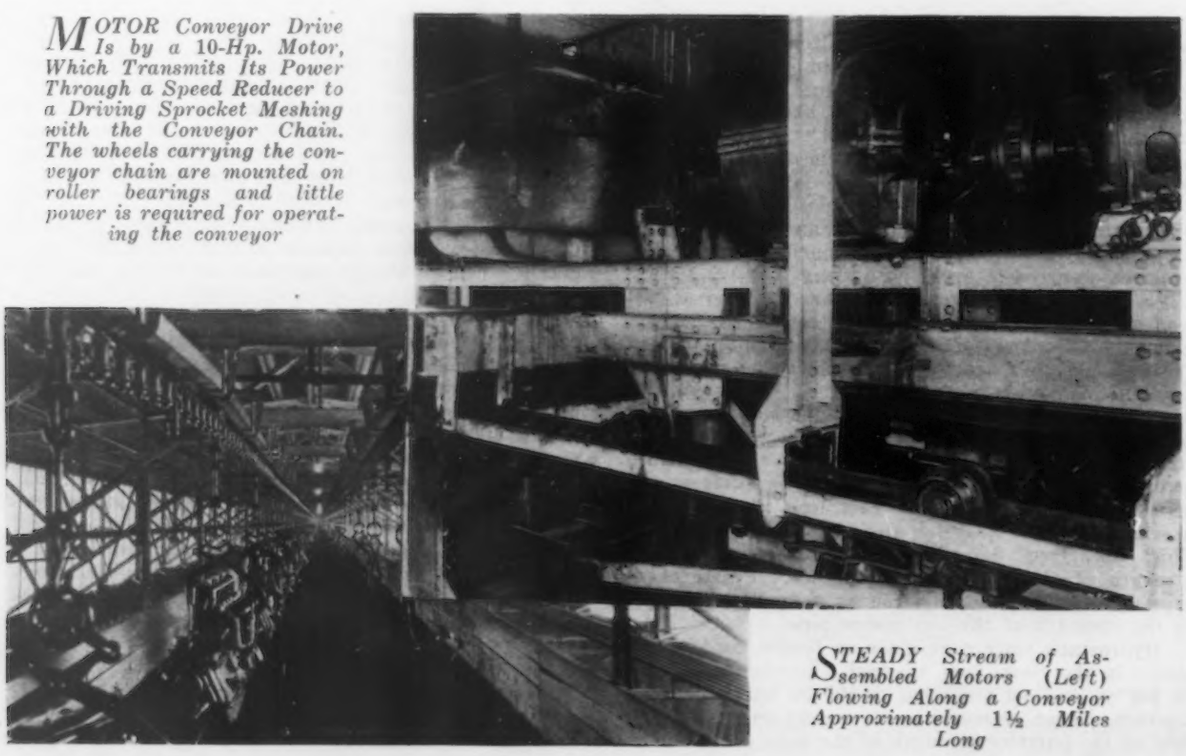
Carried on two flanged wheels 6 in. in diameter, placed on 3-ft. centers, the conveyor chain is attached to the center of the wheel axle by means of a specially designed attaching link. Two angles placed side by side, with a slot between them for the movement of the links which connect the chain to the wheels, form the track for the wheels. Hooks are suspended through links from alternate wheels. The complete motor assembly is carried by a pair of tongs hung on the hook connected to the conveyor chain. The wheels are mounted on Timken roller bearings. While the conveyor is driven by a 10-hp. motor, it runs so easily that only 3.6 hp. is actually used in operating it.

Drive from the motor is through a high-speed flexible coupling to a Palmer-Bee speed reducer, on the opposite end of which is a slow-speed mill type coupling which connects the speed reducer to a bevel pinion shaft. The pinion on this shaft meshes with a bevel gear, which transmits the power through its vertical shaft and a driving sprocket on the lower end of this shaft. This driving sprocket meshes with the conveyor chain. The conveyor, speed reducer and other mechanism in the driving unit were furnished and installed by the Palmer-Bee Co., Detroit.

The use of this conveyor has eliminated an unsatisfactory method of transporting motors to the car assembly department, has materially reduced the transportation costs and has increased the efficiency of plant operation. Before the motors were handled with conveyors they were taken to the assembly building on freight cars, necessitating loading and switching from one building to another of three railroad cars, three times a day. Now there is a steady flow of motors from the motor test room to the car assembly plant, and this and other improvements have resulted in more rapid assembling with fewer men.

Formerly 317 men on each of the three assembly lines assembled 38 cars an hour. The number of men has been reduced to 285 and the output with the decreased force has been increased to 42 cars an hour for each line. This increase in output from 12 cars to 14.7 cars for each 100 man-hours, represents a gain of 23 per cent.

MOTOR Conveyor Drive Is by a 10-Hp. Motor, Which Transmits Its Power Through a Speed Reducer to a Driving Sprocket Meshing with the Conveyor Chain. The wheels carrying the conveyor chain are mounted on roller bearings and little power is required for operating the conveyor



STEADY Stream of Assembled Motors (Left) Flowing Along a Conveyor Approximately 1½ Miles Long

Staybolt Materials Compared

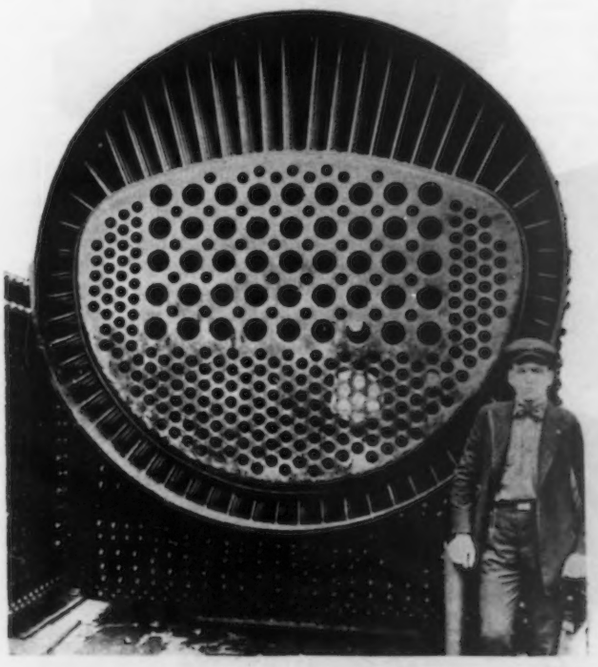
Two Independent Investigations on Wrought Iron, Steel and Alloy Steels—Conditions Under Which Staybolts Are Used

NICKEL Steel Staybolt Bent Through 180 Deg. with No Cracking on Threaded Portion

STAYBOLTS enter as an important part into the construction of certain types of boilers. Their function is to enable the firebox to resist the crushing and bursting pressure and to maintain it in proper relative position to the shell of the boiler. One end is fixed immovably in the firebox sheet, and the other end may also be fixed immovably in the boiler shell or it may be allowed some relative motion through a ball and socket joint, in which case it is known as a "flexible staybolt."

A boiler usually has more than a thousand staybolts, any one of which is liable to break and each of which must, in the case of locomotive boilers, be separately inspected once a month in accordance with the rules of the Interstate Commerce Commission. The importance of staybolts and, to some extent, their liability of failure, are indicated by these rules which provide that two adjacent broken staybolts or three broken staybolts in a 4-ft. circle or a total of five broken staybolts in the whole firebox cause the boiler to be removed from service. Thus the failure of, at most, less than ½ per cent of the total number requires immediate removal of the boiler from service.

Contributed by the Development and Research Department International Nickel Co., 67 Wall Street, New York.



Locomotive Fire Box and Tube Sheet Showing Number and Location of Staybolts; View Taken from Front of Boiler

To facilitate this constant inspection, hollow staybolts are in common use. These bolts are pierced through the center with a small hole, so that in case of a fracture the consequent leakage will disclose the failure. During inspection, however, each bolt must be rung with a hammer, the sound indicating whether or not the bolt has let go.

Loads Which a Staybolt Must Carry

The primary load on a staybolt is that which it is designed to carry—a pure tensile stress which is not excessive in relation to the strength of the materials used and which is numerically equal to the load due to steam pressure on a square of area equal to the product of the staybolt spacing distances. But a far more important load is that occasioned by expansion of the firebox and weaving of the boiler. In firing a cold boiler the firebox begins to expand longitudinally before the shell plates are hot, which results in a bending of the staybolts. Eventually, the shell is also heated and expands, so that the bending is to some degree recovered, but this recovery is never entirely complete, since there is always a marked temperature difference between the firebox sheet and the outside shell.

Furthermore, the inside of a boiler where it is in contact with hot gases is very sensitive to temperature changes. For example, the opening of the firebox door will almost instantly cause a contraction of the arch tubes and, to a lesser extent, the boiler tubes. With the closing of the door, expansion re-occurs. This movement is quite marked and has been measured. Any change in position of the inside firebox is relative to the outer shell of the boiler and naturally, therefore, causes bending of the staybolts. In addition, the entire locomotive has a certain amount of vibration.

Staybolts Subject to Stresses

The result of all these factors is that the staybolts are subject to vibration and continual, even if slight, bending motion while under tensile stress, and ideal fatigue conditions are established. Theoretically the flexible staybolt, whose head forms the ball held in a socket in the shell, is free to move and adapt itself to these changes. Actually, due to the incrustation by boiler scale and pitting and rusting by corrosion, it is questionable whether the flexible staybolt of usual design functions as such after it has been in service for any length of time and, in any event, since the inside end is fixed, any relative lineal displacement of the head (or outside end) is bound to result in some bending of the bolt.

Corrosion is also one of the important factors affecting staybolts. Located in the worst places in a boiler from a viewpoint of corrosion and subjected to stresses and to a temperature difference between the ends, both of which induce chemical corrosion, the staybolt has

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Bolts Formed and Threaded Rapidly

Fully Automatic Machine for Production Work Includes Features to Assure Full Thread at Start and Accurate Lead

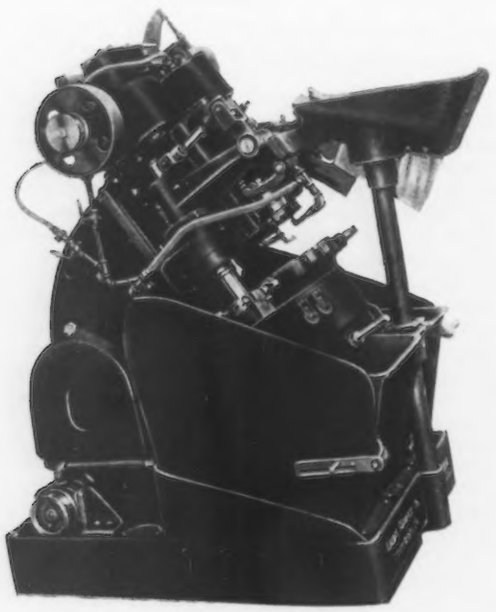
BOLTS are cut to length and have the ends formed and threaded on a high production basis on the automatic forming and threading machine here illustrated, which is being marketed by the Landis Machine Co., Waynesboro, Pa. New features are incorporated to assure full thread at the start, accurate lead, and minimum amount of taper, the arrangement employed being intended to duplicate automatically the movements of a good operator on a hand-operated threading machine.

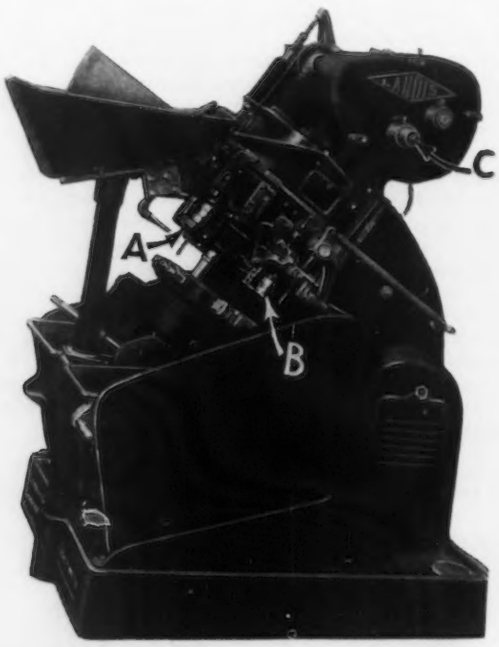
Three factors contributing to unusually high production are the arrangements for maximum speed of die head for the particular work, minimum of time between threading operations, and minimum of change-over time for different sizes of work.

The machine is intended for a variety of types of screws and bolts, including carriage, step, rim and plow bolts, ranging in diameter from 5/16 to ¾ in. and in length from 1 to 6 in., under the head. The maximum length of the thread is 2½ in.

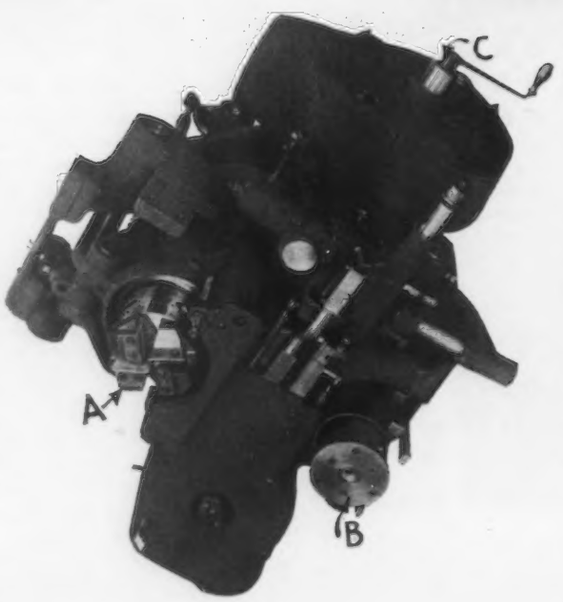
Adjustments for different lengths and diameters of bolts and lengths of thread may be made conveniently. The change for length of thread and length of bolt may be accomplished in about ten minutes and the change for diameter, pitch, length of thread and length of bolt, in approximately 55 min. One set of cams covers the entire range of the machine and no retiming or adjustment of cams is necessary.

Operation is completely automatic. Bolts to be machined are shoveled or fed from a conveyor into a hopper, from which they go to a magazine. They are then picked up by a transfer finger and delivered to chucks which are integral with an indexing turret. At the proper time, this turret indexes, bringing the blank under the forming head, where it is cut to length and the end formed. On the next indexing the bolt is





THREE Major Units of the Machine Are the Three-Station Turret with Automatic Chucks; the Forming Head; and the Threading Head. The view at the right shows the front of the threading spindle, the forming spindle and the cam housing unit



OPERATION Is Completely Automatic. From the hopper the bolts go to a magazine from which they are delivered by a transfer finger to the chucks, which are integral with the indexing turret. At every index of the turret a finished bolt is ejected from the machine

brought into the threading position, threaded and then indexed to the loading and unloading position, whereupon it is ejected. Two bolts are being worked upon simultaneously, and at every index of the turret a finished bolt is ejected from the machine.

Three major units of the machine are: The three-station work-holding turret, with automatic chucks; the forming head; and the threading head. The turret-chuck, its operating mechanism, the Geneva indexing movement and the lock bolt form a self-contained unit which is fully inclosed and runs in oil. This unit is provided with an elevating screw so that it may be raised and lowered to accommodate bolts of various lengths.

A feature stressed is the operation of the chuck jaws, which open and close on a pivot that is parallel to the bolt to be machined. This arrangement is intended to centralize and square the bolt regardless of variations in size. It also assures concentricity of the thread with the body of the bolt, and permits gripping of long bolts close to the part to be threaded, without sacrifice in the effective gripping pressure. Suitable grips for a wide variety of bolts can be furnished.

The threading head is accessibly located at the front of the machine, in full view of the operator. A special ¾-in. revolving Landex head, of pull-off type, is employed. The threading unit is counterbalanced and the advance of the die head on the bolt during the threading operation is uniform and under control at all times. This is stressed as assuring threads that are correct in lead. Die head speed changes may be made conveniently by means of pick-off gears which, together with the thread change gears, control the cycle of the threading operation. Change of threading head speed may be made in approximately 2 min. Change in this speed effects a corresponding change in the speed of the forming head, but not in the speed of the indexing mechanism, which is constant.

Gears do not control the length of the thread. The pull-off type of die head employed permits of holding the total length of the thread to close limits. This is accomplished by the use of a stop screw, which is set to stop the advance of the threading head carriage. The action of the lead of the chasers trips the die head open when the desired length has been threaded, regardless of variations in normal starting of chasers on the work. This feature is stressed as making the machine fool-proof in opening of the die head.

Both the threading and forming spindles are mounted on Timken roller bearings and are carried in slides, which are provided with square bearings and tapered gibs. The spindle slides eliminate excessive spindle overhang. The bearings are fully inclosed as protection against chips and dirt.

The forming head is accessibly located and may be reached conveniently when the turret is in a lowered position. Replacing of the form pointing tool may be quickly accomplished. A pointer is provided for relocating the turret chuck.

Heads Withdrawn and Turret Indexed at Rapid Rate

Return of the forming and threading heads and indexing of the turret is at a constant rate, regardless of the diameter, pitch, length of thread, quality of material or the threading speed. A unique feature is the "hurry-up" mechanism employed by which the threading and forming heads are automatically withdrawn and the turret indexed at a rapid rate. This time is entirely independent of the cutting speed.

Control of the finished length of the bolt is by means of an adjusting transfer bracket. A scale is provided for convenience in making this length adjustment.

Automatic safety devices are provided to prevent damage to the machine or any of its parts in case of obstruction. These devices are arranged so that the machine functions without retiming or adjustment after the obstacle or obstruction has been removed.

The chasers are flooded by two streams of coolant, one of which is delivered through the threading spindle, and the other through a nozzle located at the front of the head. The forming tool receives the coolant through the forming spindle. The coolant is contained in the base of the machine and is delivered to the tool by means of a geared pump.

Finished bolts and chips are collected in separate compartments in the front of the base of the machine. These compartments are set on an angle so that the bolts and chips can be dumped conveniently into tote boxes or other containers. The doors of these compartments when lowered form chutes over which the bolts and chips may fall into the tote boxes. An oscillating conveyor may be employed for delivering the bolts, this conveyor being fitted to the bolt compartment.

Compactness is a feature of the machine, which can be furnished for either belt or motor drive, the motor, of 3 hp., 1200 r.p.m. rating, being mounted in the base of the machine. The drive from the motor to the main drive shaft is by belt. All shafts and other parts of the machine subject to heavy duty are of alloy steel, heat-treated. Gears and cams are entirely inclosed. Centralized lubrication is employed wherever possible, all bearings not oiled by splash being lubricated through tubes from a central source. Part of the gear box and turret mechanism run in oil.

Eighteen spindle speeds are provided. The maximum and minimum speeds of the threading head spindle are 608 and 117 r.p.m., and of the forming head spindle 1173 and 223 r.p.m., respectively. The floor space required for the machine is 40 x 66 in. The net weight is 4700 lb.

Use of Aluminum Growing in Japan

Use of aluminum for wire-drawing and other industrial purposes and the manufacture of aluminum utensils in Japan has grown greatly during the past five years, according to a report to the Department of Commerce from Consul E. R. Dickover, Kobe, Japan. Official statistics show imports of 8,812,000 lb. in 1922, of 9,230,400 lb. in 1924, of 10,417,000 lb. in 1925 and of 16,767,300 lb. in 1926, compared with an annual pre-war consumption of about 1,250,000 lb.

Sources of Japanese imports of aluminum vary considerably from year to year, depending upon prices prevailing in countries of origin, exchange rates and other circumstances. Before 1912 Europe supplied the entire Japanese demand, but in that year the United States entered the market with 23 per cent of the total importation. The bulk of the supply in preceding years was from Great Britain, Germany and France. There was marked variation in the following years in the proportion furnished by the United States, which provided the entire supply in 1916. The general tendency since the war seems to be upward, although the American share is much smaller than from 1916 to 1919.

Detailed statistics for 1926 are not yet available, but indications are that as large a proportion of American aluminum was imported as in 1925. In the preceding years the American share increased rapidly, from 1,254,000 lb. or 14 per cent in 1922 to 2,281,100 lb. or 28 per cent in 1923 and 6,735,400 lb. or 64 per cent in 1926.

The great bulk of the aluminum is imported into Japan in the form of ingots, 45 per cent being used for the manufacture of kitchen and other utensils, 35 per cent for wire and steel-core aluminum cable, 10 per cent for alloys and part of the remainder for castings for automobile and airplane engines. The utensils industry is centered in Osaka and Tokio, with the bulk of production in Osaka, owing partly to the large supply of skilled labor available there and partly to its convenience for domestic and foreign distribution. Aluminum manufactures go almost entirely to Oriental countries. The other aluminum industries are scattered through the country.

Talks on Industrial Mobilization

Col. Frank A. Scott, of the Warner & Swasey Co., Cleveland, delivered a formal address on "How the United States Has Planned for Industrial Mobilization" before the Army War College in Washington on Dec. 16. On the day following he talked informally on "Some Aspects of Industrial Mobilization" before students of the Army Industrial College. Colonel Scott addresses each of these institutions annually.

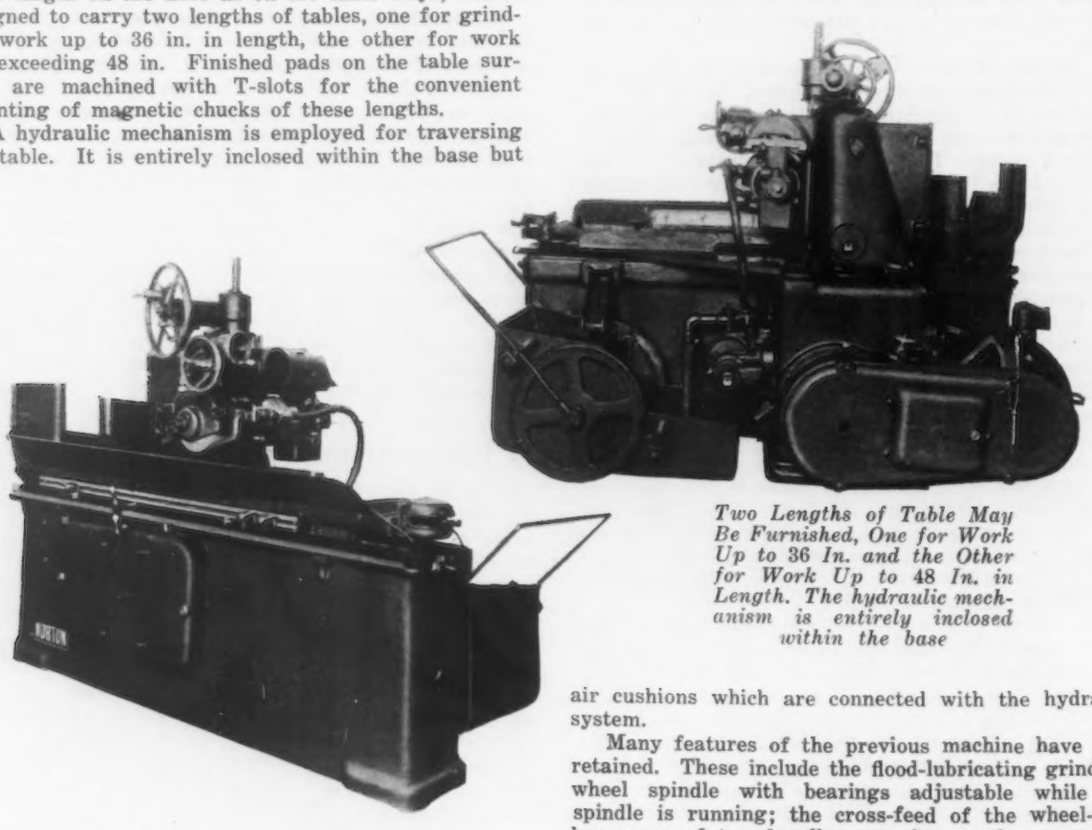
NEW SURFACE GRINDER

Hydraulic Table Traverse a Feature—Base Designed for Two Lengths of Table

A HYDRAULIC surface-grinding machine is a recent addition to the line of the Norton Co., Worcester, Mass., and replaces the open-side model previously marketed by the company.

The new machine has a longer base, which is the same length on the floor as on the table ways, and is designed to carry two lengths of tables, one for grinding work up to 36 in. in length, the other for work not exceeding 48 in. Finished pads on the table surface are machined with T-slots for the convenient mounting of magnetic chucks of these lengths.

A hydraulic mechanism is employed for traversing the table. It is entirely inclosed within the base but



Two Lengths of Table May Be Furnished, One for Work Up to 36 In. and the Other for Work Up to 48 In. in Length. The hydraulic mechanism is entirely inclosed within the base

is accessible through two doors at the front. Two levers mounted between these base doors control all movements of the table. The upper lever is used for reversing the table motion, either by hand or automatically, at the end of the stroke, the length of which is determined by the setting of a dog at either end of the table. The second of the two dogs seen on the right at the front of the table is employed in locating the table at the same position relative to the grinding wheel for truing. By pulling the reverse lever toward the operator the first dog is passed, but the lever is tripped by the second dog, which it cannot pass.

Control of the speed of table traverse is by means of the lower lever through a valve, and this lever may be used also in stopping the table motion, although this function commonly is performed by the reverse lever moved to its central position, thus accomplishing the purpose without disturbing the setting for the table speed desired. Table speed for grinding may be varied from 30 to 90 ft. per min. Smooth reversal of the table at high speed is accomplished by the use of air cushions which are connected with the hydraulic system.

Many features of the previous machine have been retained. These include the flood-lubricating grinding-wheel spindle with bearings adjustable while the spindle is running; the cross-feed of the wheel-slide by means of two handles, one for regular operation, the other for slow motion while truing; and the vertical wheel feed which is graduated to 0.00025 in.

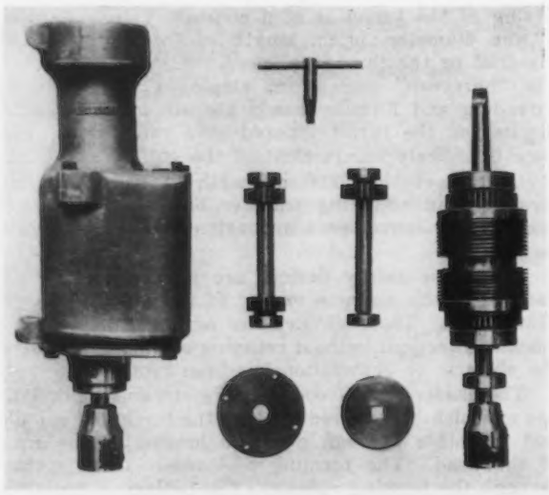
Power for both spindle drive and hydraulic table traverse is provided from a standard 15-hp. constant-speed motor bolted on the rear of the base. The standard grinding wheel used is 10 in. by 3 in. by 3 in., counterbored both sides 5½ by ¾ in. deep. Flanges for holding the wheel are 5¼ in. diameter. The weights of the machine with its two beds are respectively 7300 and 7400 lb. The length of the base is 8 ft.

New Friction Tapper for Fosdick Sensitive Drills

For use on its high-speed sensitive drills, the Fosdick Machine Tool Co., Cincinnati, has devised a new patented friction tapper. It can be applied to the lower end of the spindle sleeves. It is claimed that it will tap to the bottom of holes without danger of tap breakage.

The forward and reverse mechanism consists of two sensitive self-adjusting multiple-disk frictions running in oil. Downward pressure on the feed lever drives the tap forward, while upward pressure reverses the tap for backing out. An adjustable depth stop is provided for accurate depth tapping and the tapper releases automatically at the desired depth. Ball bearings are used on all revolving parts.

The tapper is available, made in three sizes, the smallest having a capacity of 3/16 in. at 3000 r.p.m., the next 5/16 in. at 1500 r.p.m. and the largest size ½ in. at 500 r.p.m.



Power Press for Heavier Gage Work In Jobbing and Production Shops

In response to the trend toward heavier gages in the product of shops engaged in fabricating sheet metal, the Service Machine Co., Elizabeth, N. J. has brought out a punching press of improved design, designated as the P-No. 25½. The machine is a combination of adjustable bed and deep-throat punching press and has capacity of 30 tons pressure near the bottom of the stroke.

The general arrangement of the machine may be noted from the accompanying illustration. The gap in the housing, or throat, is 20 in. deep from the center of the slide, which permits piercing to the center of sheets 36 in. or more wide and at the same time provides for the use of adjustable back gages that are an essential part of utility dies. The slide has an improved up-and-down adjustment of 3 in., the range in shut height of ordinary type dies being provided for by this feature. A positive knockout in the slide is also provided. The bed, which measures 16 x 24 in. is a separate knee casting, and is adjustable in height from 6 in. to 14 in. which permits the setting of deep drawing and forming dies and fixtures for lock seaming and curling operations and a variety of other work. The clutch is designed so that when set for regular work, a repeat in the stroke is impossible until treadle has returned to dead position and is again depressed. The parts of the clutch are made of tool steel, heat treated, and are liberally proportioned. The eccentric shaft is a one-piece alloy-steel hammer forging. An oil reservoir supplies lubrication to flywheel and working parts. Steel brake bands are lined with Raybestos.

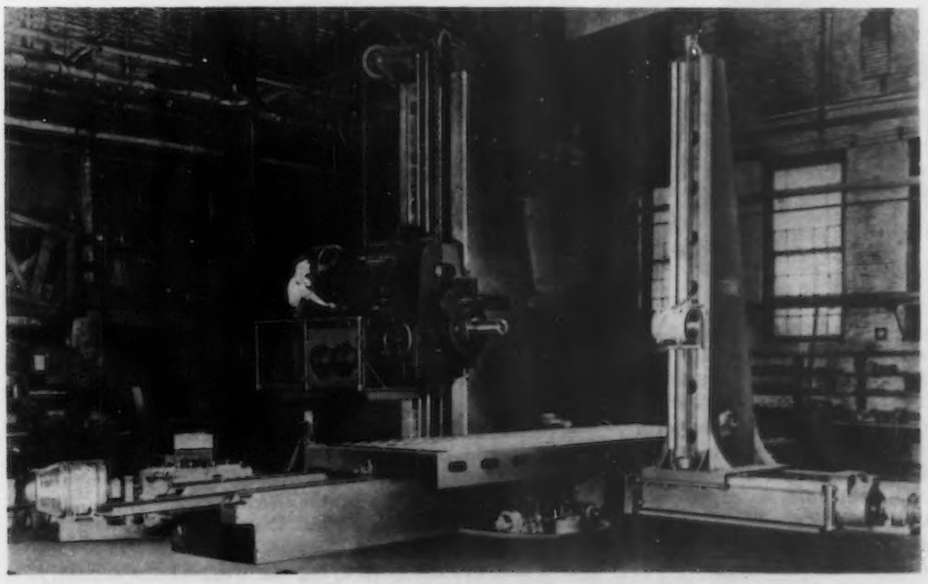
The press here shown is equipped to function as a nibbling machine, the universal nibbling table being a separate attachment which may be removed when the press is wanted for other work. To operate the nibbling table at a speed of about 200 r.p.m. a second driving pinion is provided for the motor and two settings of the motor to the motor bracket. The attachment consists of three parts, a lower section which is bolted to the press bed, a middle section which slides backward and forward, and a top table back which slides in the lateral direction. The slides are provided with adjustable gibs for taking up wear and operate by means of rack and pinion. Four-way adjustable gages and adjustable clamps provide for the quick and accurate setting of both flat and contour work. The gages have micrometer setting and positive lock to eliminate slippage. An advantage emphasized in connection with this attachment, especially in a jobbing shop, is that for small runs of work requiring piercing to a given size and shape of opening, the making of a template, rather than an expensive die, is all that is necessary. This template is clamped in the front extension of the table, gages may be quickly and accurately set and, it is clamped, the work run through at the average rate of three pieces per minute. A number of other utility devices have been brought out by the Service company.

The Press May Be Equipped with a Universal Nibbling Table, as Shown, Which May Be Removed to Permit Using Press for Other Work

Horizontal Boring, Drilling and Milling Machine with 7-In. Spindle

A heavy-duty horizontal boring, drilling and milling machine with planer-type table, built recently by William Sellers & Co., Inc., Philadelphia, for the Bartlett-Hayward Co., Baltimore, is shown in the accompanying illustration. The machine is for a variety of work.

Three major units of the machine are the head and column, the planer type table and the outboard support. The head, mounted on a column of heavy design, is



The Head Is Provided With Power Traverse and a Large Series of Milling Feeds, as Well as Boring and Drilling Feeds. The spindle is carried close to the upright and is arranged to rotate in a sleeve upon which is mounted the driving gear

counterweighted to facilitate movement, and is provided with power traverse and a large series of milling feeds as well as boring and drilling feeds. The table is provided with power traverse and milling feeds. The outboard support consists of an upright carrying a bearing to support the boring bar, the upright being arranged to move to or from the table for various sizes of work. The bearing travels vertically in unison with the work head except when milling.

The diameter of spindle on the work head is 7 in. and it has a 5 ft. continuous stroke. The travel of the head vertically is 11 ft. starting from a point 5 in. from the top of the table. The table is 6 ft. wide and 18 ft. long and its total travel is 16 ft.

The spindle is carried close to the upright, to give maximum rigidity, and is arranged to rotate in a sleeve upon which is mounted the driving gear. The spindle is held in the sleeve by two bronze taper adjustable bushings and driven by two large keys. It is pointed out that the spindle is thus free to slide in and out without the strain of driving gears, and the bronze bushings are not subjected to wear from rotation. The drive for the spindle is simple. A 15-hp. motor is mounted directly on the work head, permitting the use of a gear train made up entirely of spur gears. The shafts are short and well supported by bronze bushed bearings. Gears and bearings are oiled from a central lubricating tank at the top of the head. Spindle speeds range from 2 to 200 r.p.m., obtained by means of sliding gears together with the adjustable speed motor. Drilling and boring feeds range from 1/192 in. to 1 in. per revolution of spindle. Quick power traverse and hand adjustment are provided for moving the spindle in and out. The motor that drives the spindle provides power traverse of 7½ ft. per min. and milling feeds from ¼ in. to 18 in. per min. vertically.

The upright which carries the work head is of box section with heavy walls and ribbed to provide stiffness. The work table is also of box section, with top and bottom plates, and is carried on one flat and one double-Vee way on the bed. The double-Vee way consists of two separate Vees, one of which is of the usual angle and supports the weight of the table. The other Vee is above the first and its surfaces are at an angle of 3 deg. to the vertical, thus presenting, it is stated, an almost vertical wall to oppose the side motion of the table should there be any tendency in that direction. Holding-down shoes are arranged at both sides of the table to prevent lifting under heavy cuts.

A 7½-hp. adjustable-speed motor provides the quick traverse and feed for the table. The drive, which is through the Sellers spiral pinion and angular rack, is simple. A gear box mounted at the side of the bed provides the change of speed with the 3 to 1 motor. Steel herringbone gears connect the gear box to the spiral pinion shaft. The ways of the table and all bearings of the driving shaft are fed by oil under pressure, other bearings, such as those in the change of speed box, being oiled from a central tank by gravity.

The outboard support is of simple design and is moved in unison with the work head by means of a shaft running under the table. The upright slides horizontally on a separate bed. A small motor is provided for this purpose.

Safety features include the interlocking of the main motor with the motor for feeding the table. If the spindle motor should stop, due to overload or other causes, the feed motor will instantly be shut down. The feed motor cannot be started until the driving motor is in motion. Limit stops are provided at each end of the spindle travel.

New Chucking Outfit for Hartness Flat Turret Lathes

Chucking outfits for 12-, 15- and 17-in. Hartness flat turret lathes of the Jones & Lamson Machine Co., Springfield, Vt., have been revised to provide sufficent tools for the general run of work that comes to such lathes so that the machine may be used as received without further investment in special tools. The

Forged Tools Are Larger and the Tool Holders Are of New Design. The tool plate is made in one large ring to increase rigidity of tool mounting

number of tools in the new outfit is intended to permit a maximum of multiple tooling on complicated work.

Forged tools supplied with the outfit are of larger size than previously and the tool holders, of new and rigid design, utilize standard tool bits. The tool holders are designed for fast speeds and coarse speeds and are of broadnose type to absorb the heat.

On the 12- and 15-in. lathes, and on the 17-in. machine with round turret, the tool plate now supplied is made in one large ring rather than in sectors as previously, which construction is intended to increase considerably the rigidity of the tool mounting. The solid ring will be supplied with the standard chucking outfit. For combination bar and chucking work or for cases where special tools are to be used, the six-part segments will be supplied.

Ornamental Iron and Bronze Work Illustrated

A booklet, 9¼ x 11 in., containing 68 pages of photographs of ornamental iron and bronze work, has been issued by the National Association of Ornamental Iron and Bronze Manufacturers, 622 Broadway, Cincinnati. In addition to the illustrations of the varied uses of bronze and wrought iron in architectural and interior ornament, there is an accompanying outline of the specifications. Each represents work that has been completed by members of the association in various parts of the country.

A brief introduction points to our changed conception of the use of ornament in building and the growing use of wrought iron and bronze, which have been part and parcel of architectural history since its beginnings.

Among the many illustrations of iron and bronze work, entrance doors to office and bank buildings and private homes predominate, but there are also a number of photographs of wrought iron and bronze stair railings, created with infinite detail of craftsmanship, fences and entrance gates to estates and public grounds, wrought iron balconies, store fronts of both wrought and cast iron and bronze, bank interiors, tables, fire screens, and baskets, clocks and lighting fixtures and elevator doors.

The booklet contains a list of the 272 members of the association in 22 States, Hawaii and Canada, and in conclusion it is pointed out that this is the first of an intended series of booklets on the subject of wrought iron and bronze, portraying the work of the industry.

HIGH-SPEED PUNCH PRESS

Prolonged Life of Dies Claimed for New Machine Which Operates at 300 Strokes per Min.

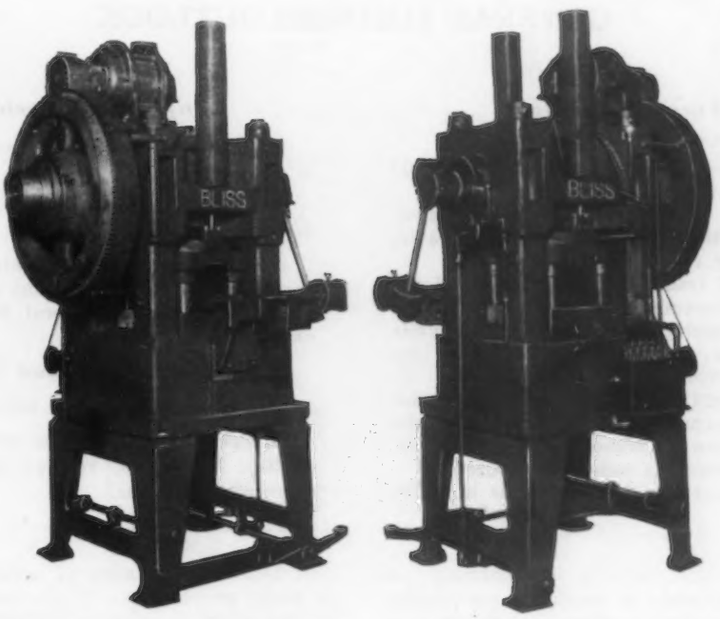
INCREASED life of tools on high-speed punching operations is an important claim made for a new press brought out recently by the E. W. Bliss Co., Brooklyn, N. Y. The machine is intended particularly for punch press work and is designed to operate at 300 strokes per min.

Factors contributing to the prolonged life of dies used in the machine include massive frame, keyed in alinement and tied together with oversize tie-rods. These rods are shrunk-in on the housings under an initial tension in excess of the rated load of the machines. The eccentric type shaft is supported right up to the crankpin. Substantial subpresses with large hardened and ground pins and bushings further assure alinement.

Short stroke, to keep down the working velocity of the punches, is a feature, and all moving parts are compact and their weight is counterbalanced by long compound springs. The distance from the face of the slide to the center line of the crankshaft is short. These machines being for one class of work, largely blanking, large adjustment is not required. The adjusting wedge provided furnishes ample adjustment and is controlled by a screw with a disk graduated to facilitate making of fine settings.

The clutch employed is the Bliss high-speed rolling key type. It is stated that the hardened alloy steel rolling key presents a long and entirely backed-up surface to engagement with the wheel bushing, at a lower lineal velocity than usual, due to the closeness of the key to the center line of the shaft. For this service special long hook clutches and latches are provided so that, after the key has rolled out of engagement, an extra long period is allowed for the brake to bring the shaft to rest, before the positive-stop hook reaches the latch recoil. Brakes used are of the intermittent type which are free while the press is running.

Thorough attention has been given to lubrication. Most of the bearing surfaces are steel on bronze, trapped to return the oil to the slide and thence through a strainer to the tank. A positive force-feed pump with separate lines to each bearing distributes the oil. Any opening desired can be provided in the bed for dropping the work through. Working parts are on top of the machine, leaving the floor space about the machine unencumbered.



High-Speed Press Equipped with Continuously-Operating Single-Roll Feed. The lubricating system is shown in the rear view, at the right

Mechanical feeds of several types, including single-and-double roll feeds driven continuously or intermittently, and magazine feeds can be furnished. The accompanying illustrations show the press as equipped with a continuously-operating single-roll feed driven through hardened spiral gears and equipped with a modified flying stop gage. In the double-roll feed, the rolls are hollow and hardened on the surface, and roller guides are provided. Adjustment of the roll relief is independent of the feed stroke adjustment, permitting close settings. An accurate friction drive with hardened rings and rollers such as used on the standard Bliss roll feeds, is employed unless the single or multiple-pawl ratchet type is preferred. The feed is arranged to operate either front and back or right and left across the bed as required, leaving the dies conveniently accessible. The sub-press may be removed conveniently if necessary, but is not removed for changing dies.

Plans Maturing for Steel Treaters' Semi-Annual Meeting

A tentative schedule has been arranged for the first semi-annual meeting of the American Society for Steel Treating which will be held at the Mount Royal Hotel, Montreal, Feb. 16 and 17. As has been the custom at the sectional meetings in the past, the board of directors will meet on Feb. 15, previous to the regular convention, and there will also be meetings of the recommended practice committee and the publication committee. In the evening there will be an early birds' dinner which has also been a feature of the sectional meetings. Following the dinner, members and guests will be given the option of tobogganning or a theater party.

The technical sessions are scheduled for the morning, afternoon and evening of Thursday, Feb. 16 and the morning and evening of Friday, Feb. 17. The usual dinner will be held Thursday evening and there will be an informal dinner Friday evening with a technical session following it. Friday afternoon will be devoted to plant inspections. The companies which have thrown open their doors are: the Canadian Steel Foundries; McVickers, Ltd., the largest Canadian producers of airplanes; the Dominion Engineering Works, Ltd., and the Dominion Iron Works, Ltd.

Those who can spend Saturday in Montreal will have a chance to attend a champion ski-jumping event in the afternoon and the professional hockey game between Detroit and the Montreal Maroons in the evening.

Foundry Equipment Orders

Based on reports from 18 companies, members of the Foundry Equipment Manufacturers' Association had net orders in November at 95 per cent of the average monthly shipments of 1922-1923-1924. Shipments were at 97.2 per cent and unfilled orders represented 105.8 per cent of a month's average output.

Compared with many months preceding last July 1 the orders show a heavy decline. They were above those of July and September, but below those of August and October. They were, however, only half as great as last February.

Business Analysis and Forecast

BY DR. LEWIS H. HANEY

DIRECTOR, NEW YORK UNIVERSITY BUREAU OF BUSINESS RESEARCH

GENERAL BUSINESS OUTLOOK

Favorable Factors

1. The P-V line continues to rise.
2. Production is curtailed and in general well adjusted to consumption.
3. Farm purchasing power is fairly good; condition of winter wheat favorable.
4. Money continues easy.
5. Retail trade made a fairly good recovery in November.
6. Contemplated new construction, building permits and real estate activity increased in November.
7. Resumption of Ford production and plans for expansion by other automobile manufacturers; increased buying of sheets.
8. A sizable tax reduction assured.
9. Resumption of a gold basis in Italy.

Unfavorable Factors

1. The rising trend of commodity prices is checked.
2. Decline in employment, earnings and payrolls of factory labor.
3. Continued gradual tightening in the fundamental position of bank credit; large gold exports, lower Federal Reserve ratio, excessive brokers' loans.
4. Foreign trade declined in November.
5. Recession in textile industries.
6. Political uncertainties concerning candidates, legislation, various investigations concerning business.

INSOFAR as industrial activity and earnings are concerned, the fundamental conditions are predominantly favorable and an early recovery is indicated. The financial position, however, is less favorable, so that any considerable expansion in business will probably bring some strain in bank credit. And the low level of factory employment and reduced payrolls will for a time act as a drag on business recovery.

Early Resumption in Steel Expected

AS shown in the first chart, the situation as to the relative position of the P-V line and steel ingot production resembles that which existed in April, 1921, December, 1923, July, 1924, and June, 1925. Perhaps the 1924 resemblance is the closest. *In all these cases steel production was at or near the bottom of a recession and soon began a considerable period of expansion.*

The situation is as follows: Allowing for seasonal conditions and for the normal growth of the industry, steel production has fallen about 30 per cent from the peak reached in 1926 and is now actually about 15 per cent below our estimate of normal. Such a decline is of major proportions. While not so sharp or so great as that which occurred in 1923-1924, it is probably true that there has not been recently so much over-production to correct, and that stocks are smaller. The recent decline, therefore, seems adequate to correct the existing situation and to bring the industry into line with general business requirements.

Stage Is Set for Larger Steel Output

On the other hand, the P-V line has risen for seven months, which is as long a period as that by which its upturn in 1921 preceded the bottom of steel production. It is much longer than the analogous period in 1924. The P-V line has risen above its normal and above the 100 per cent base line, which events have never happened during the history of this barometer without a recovery in steel production. The conclusion need hardly be stated.

We merely restate the significance of a rise in the P-V line such as has recently occurred. It reflects the fact that the supply of commodities has on the average been reduced, while the demand for commodities has

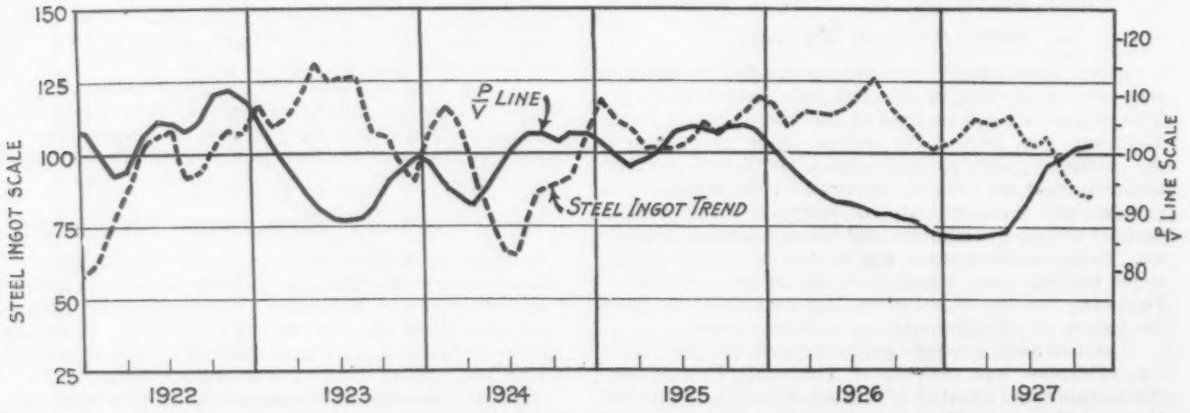
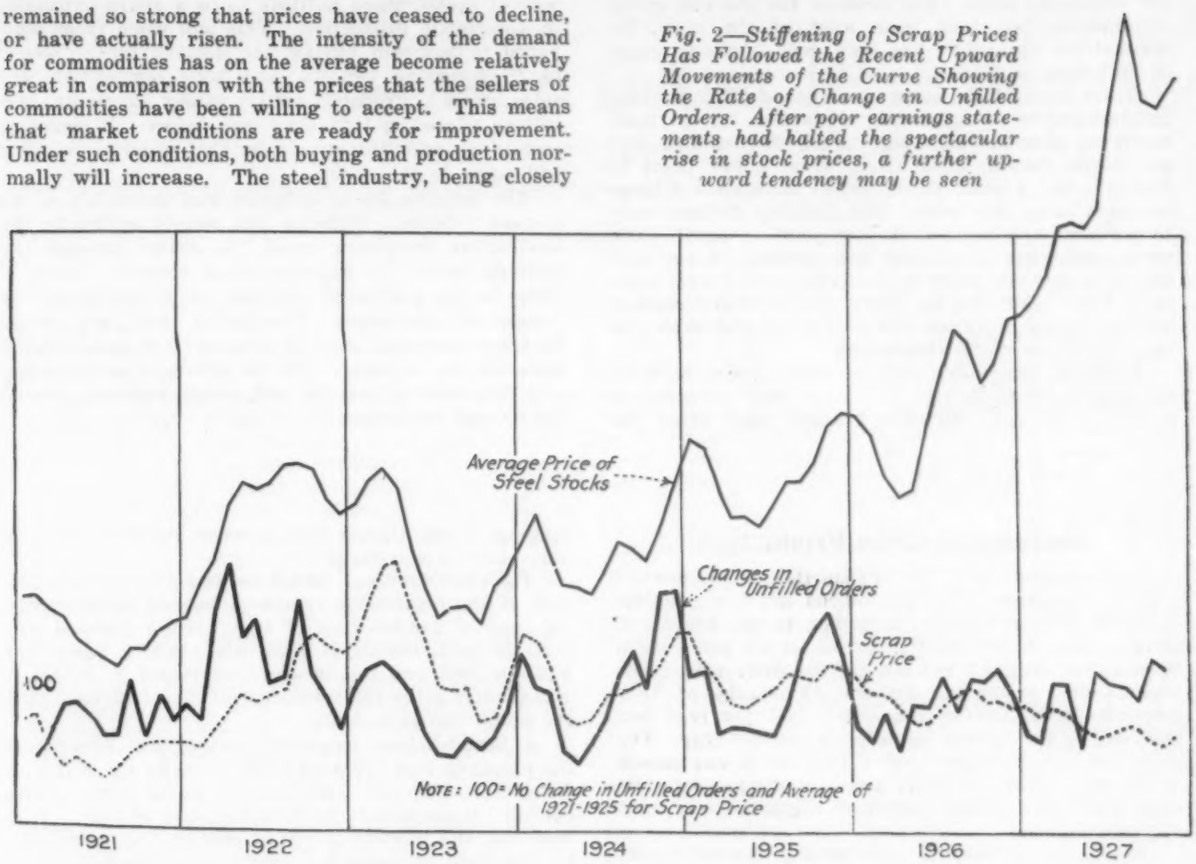


Fig. 1—Upward Movement of the P-V Line (Representing the Ratio of Commodity Prices to the Physical Volume of Trade) Has Continued for Seven Months. This presages early improvement in business and forecasts both better buying and firmer prices. Ingot production should show a healthy improvement to correspond

remained so strong that prices have ceased to decline, or have actually risen. The intensity of the demand for commodities has on the average become relatively great in comparison with the prices that the sellers of commodities have been willing to accept. This means that market conditions are ready for improvement. Under such conditions, both buying and production normally will increase. The steel industry, being closely related to most other industries, will naturally benefit by the general improvement.

Fig. 2—Stiffening of Scrap Prices Has Followed the Recent Upward Movements of the Curve Showing the Rate of Change in Unfilled Orders. After poor earnings statements had halted the spectacular rise in stock prices, a further upward tendency may be seen



Stronger Prices Looked For

No pronounced change is shown in the November steel barometers, as illustrated in the second chart. The unfilled orders of the Steel Corporation increased, but at a less rapid rate than in October. Obviously the showing in this respect is neither very good nor very bad. No real gain in buying is indicated, in view of the decreased production during the month. But as long as the rate-of-change curve remains above the base line it can be said that the "backlog" of unfilled orders is at least not decreasing. Then the scrap markets became a little stronger, after reaching the lowest point since February, 1922. The price of heavy melting scrap at Pittsburgh has risen by $1 a ton. This at least indicates that the dealers hope for stronger markets in early 1928, and scrap dealers are notably shrewd in judging trends.

The average price of a representative group of steel stocks showed recovery in December, and the recent action of the market for such securities clearly shows the opinion of large investors and traders, that the outlook for the steel industry has improved. The notably large buying of United States Steel Corporation stocks last week, accompanied by advances in a number of other steel issues, while no doubt influenced by the speculative sentiment of the day, is impressive. It certainly can be said with reason that there is no such indication of a coming decline in steel stocks as there was in early 1923, or at the end of 1924 and 1925.

Construction Is Active and Automotive Output Will Improve

Pronounced divergence of trend between two basic industries, automobile production and building activity, is the outstanding point illustrated in the third chart. No such sharp and prolonged difference in trend is on record. It would almost seem that people are again giving more attention to their homes and less to roaming around on the highways. It is to be remembered, however, that "building" includes construction of bridges, public works, etc., and that a curve of building "permits" representing building of residences and stores in cities would look much more like the automobile curve. In the second place, the automobile curve is much affected by the Ford situation. People are still rolling around in automobiles, but, at least, insofar as Fords are concerned, they are rolling in old cars. Moreover, a good many people have awaited the new Ford and the action of competing producers before replacing their old cars.

As to the steel industry, the two curves tell the story of the market for sheets and strips vs. the market

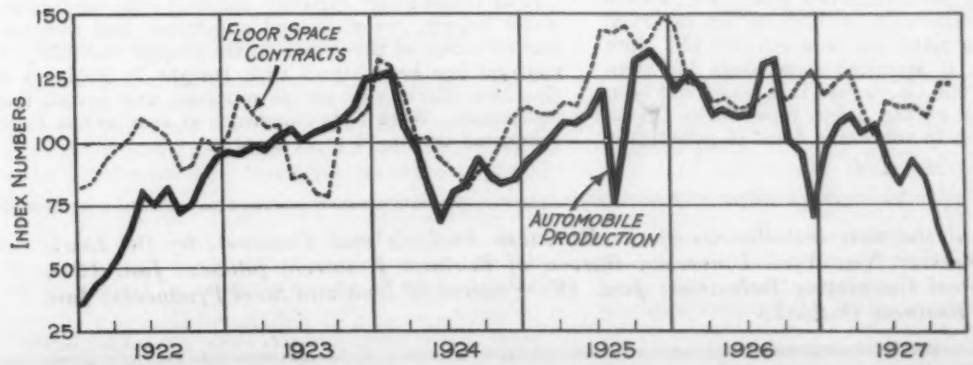


Fig. 3 — Potential Demand for Steel from Construction Activity Has Been Well Sustained. Reduction in the automobile demand is thought to have about reached bottom

for structural steel. The demand for the one group of products has been poor most of the year; the demand for the other has been good—indeed, larger in 1927 than in 1926.

There seems to be no precise method of forecasting future building or automobile production, but we must resort to general reasoning. Both the building and automobile curves, after rising from a low point in 1924, reached a peak late in 1925. Both show a large recession since that peak. But building declined only 18 per cent and reached its low point in April, 1927, while automobile production has declined 63 per cent and hit a new low point in November—the lowest since early 1922. Both tell the story of a cyclical recession, but the slump in automobile production and sales has been much the more pronounced.

Building has fallen only a little below normal; automobile production is far below any estimate of normal. We can, therefore, reason that, after the way of cycles, there is likely to be a sharp expansion in automobile production. This will come from postponed replacement buying, the demand for a "second car," increasing exports, and keen competition and sales effort. Probably better values in motor cars will be offered in 1927 than ever before. It seems as certain as such things can be that a large recovery will occur in the spring.

The building curve indicates less possibility of an upward rebound. Building has merely settled to the level of an imaginary trend line drawn through the building curve. It appears about normal. There is little or no postponed building of a residential or commercial character. Residential rents are lower. On the other hand, interest rates are low and building materials are cheaper. On the whole, it seems probable that building activity will merely fluctuate around the normal trend line.

Decrease in Coke Production

WASHINGTON, Dec. 23.—Production of by-product coke in November totaled 3,500,000 net tons, against 3,713,000 tons in October, according to the Bureau of Mines. This represented a decline of 5.7 per cent in volume, but only 2.6 per cent in the daily rate. The accumulated production for the 11 months of 1927 amounted to 40,249,000 tons, about 1.1 per cent less than during the corresponding period of last year. The daily rate for November was the lowest in any month of the year. There were 77 active plants and two idle ones and these plants produced about 74 per cent of their capacity.

Production of beehive coke during November declined also, the total being 379,000 tons, which was 40,000 tons, or 9.5 per cent, less than that of October. The November output was the smallest for any month during 1927 and the cumulative total to Dec. 1 was 43 per cent behind the same period of 1926.

Wheeling Corporation Buys Old National Tube Plant

The Wheeling Steel Corporation has acquired the Riverside works of the National Tube Co., Benwood, W. Va., according to an announcement by Isaac M. Scott, president. Through its purchase the Wheeling corporation now will be able to supply its own pipe plant at Benwood with hot metal instead of bringing cold pig iron from its Top furnace in Wheeling and the Martins Ferry furnace at Martins Ferry, Ohio. Embraced in the purchase are the two Riverside blast furnaces, all buildings, trackage and switches, the Benwood & Connecting Railroad and a site of 70 acres. The steel plant, skelp mills and pipe-making equipment are not included in the sale; these units will be dismantled and scrapped by the National Tube Co. The sale confirms a report in THE IRON AGE, Nov. 24, that the Wheeling corporation was negotiating for the property. At that time its interest was in No. 2 stack, the more modern of the two blast furnaces, for the purpose of operating it and supplying its Benwood works with molten iron.

The National Tube Co. has not made any pipe at the Riverside works for more than two years, and, except for some experimental work in 1926 on an electrical welding process, the plant has been entirely idle since early in 1926 when it produced some skelp for shipment to the Gary Tube Co., before that plant had been completed. It is one of the oldest pipe works in the country, dating back to the early days of rolled pipe making in the United States, when the raw material was puddled iron skelp.

The blast furnaces, which are the principal acquisition of the purchasing company, have a rated annual capacity of 243,000 tons of iron. No. 1 furnace was built in 1871, rebuilt in 1903, while No. 2 stack was built in 1903 and rebuilt and modernized in 1925. It was shortly after the rebuilding of No. 2 furnace that the plant was shut down.

A Semet-Solvay by-product coke plant located on the property, and operated under lease by the National Tube Co., some time ago reverted to its owners, who operated it for a time on domestic sizes of coke. It is now idle, and whether it will be operated again on coke for the blast furnaces is a matter of conjecture.

To Exploit Ontario Iron Ore Deposits

TORONTO, ONT., Dec. 27.—In an interview, James Lyons, former Minister of Lands and Forests in the Ontario Government, stated that there is prospect of an early expansion of the iron and steel industry in the Sault Ste. Marie, Ont., district to include the exploitation of the large deposits of low-grade iron ore there. The Algoma Steel Corporation, he said, has all but completed plans for refinancing to put the company on a basis that will enable it to utilize this ore.

Technical problems of beneficiation have been worked out, but the cost, at present, of reducing the ore is from 60c. to $1 per ton higher than it is in competing plants in the United States. The ½ per cent per unit bonus granted by the Ontario Government reduces this disparity by 35c. per ton. If the Federal Government would grant an additional ½ per cent per unit, the disparity would be practically wiped out and a large part of the iron and steel produced in Canada could be made from this ore.

Gulf States Steel Co. Improvements

Details of improvements to be made by the Gulf States Steel Co. at its Alabama City, Ala., works were announced last Wednesday. The program includes four 900-hp. boilers with necessary appurtenances; two 60,000-cu. ft. per min. turbo-blowers; electric generators of 10,000 kwhr. capacity, together with condensers, water supply, reservoir and standpipes and complete electrification of the drives on the present rod mill. A contract has been placed with Dwight P. Robinson & Co., New York, who are to purchase and install this equipment. Work is to commence at once and is to be completed within 10 to 11 months.

Schedule of the next installments of the ***Business Analysis and Forecast****, by Dr. Lewis H. Haney, Director New York University Bureau of Business Research, follows:* ***Jan. 12****—Activity in Steel Consuming Industries;* ***Jan. 19****—Position of Iron and Steel Producers;* ***Jan. 26****—General Business Outlook.*

How to Develop Better Foremen

Tact Necessary in Introducing Training Plan—Interest Best Maintained by Short Meetings with Definite Programs

BY C. W. BURGESS*

AN important feature of industrial education, which has received a great deal of attention for some time past, is that which is frequently termed "foreman training."

When an individual voluntarily seeks knowledge he repairs to the logical source and is readily amenable to instruction. But when knowledge is brought to him and its acquirement is made mandatory, even in a remote degree, tact is primarily an essential in its introduction to avoid engendering a feeling of offended dignity and rendering a realization of the objective difficult of attainment, if not impossible, at the start.

This is particularly true where the individual has already attained a position of some responsibility.

What "Training" Means to the Average Mind

The word "training," used in the sense referred to, implies "bringing to a state of proficiency by prolonged instruction, practice, etc." The literal application of the term "foreman training," therefore, would mean to train men so that they would be eligible for promotion to a foremanship.

There is great need in industry for foreman training thus interpreted, to provide a supply of competent men to meet the constant demand for new incumbents in supervisory positions. Attention is already being given to this need, particularly where well defined apprenticeship programs exist, providing a wealth of prospects from which to select promising material.

The Foreman's Attitude Toward Training

But the attention of industrial educators just now is more extensively turned toward those individuals who occupy supervisory positions, the responsibilities of which have been borne by many of them for long periods. These men, regardless of their qualifications, or lack thereof, from a purely educational standpoint, are possessed of practical knowledge and experience and have a feeling of justifiable pride in their industrial status, to which a large majority of them have risen in the face of keen competition.

To propose to such individuals, no matter how tactfully, that they are to undergo a course of "training" is manifestly an error in judgment and a mode of approach which is certain to arouse antagonism. The spirit of interested cooperation on their part, so essential to success, is immediately rendered conspicuous by its absence.

Even the indirect use of the term, "foreman training," in the promulgation and development of this phase of industrial education through conferences, public addresses and publications (many of which come to the foreman's attention) is certain to cause an unfavorable reaction in his mind, creating instinctively an attitude inimical to the achievement of the result sought.

Training Should Not Be Distinctively Instructional

As a result of the rapid growth of industry, the direct line of contact and communication between employer and employee has been drawn too fine, often to the breaking point, and these breaks have been bridged by the interjection of intermediaries—the supervisory staff.

The foremen, being the direct points of contact with "labor" and in a majority in point of numbers in the supervisory staff, particularly in large enterprises, present the logical foundation upon which to base a plan for reconstruction. They bear the brunt of pressure from above and from below.

The intent of any remedial measures proposed, then, should clearly be of a constructively helpful rather than of a distinctly instructional nature. It is desired to bring the foreman into his rightful prominence as an important factor in plant operation; to establish a better understanding between management and the foreman, so that he, in turn, may more clearly interpret the feelings, the hopes, the aspirations of management in connection with the conduct of the enterprise to those workers directly under his supervision, arousing their interest and cooperative effort to a full degree compatible with their individual measure of responsibility for its successful operation and, sequentially, their own success and prosperity.

Help Needed in Solving Problems Affecting Other Departments

Many problems of varying degrees of magnitude, importance and vexatious character daily confront the foreman, which he disposes of in the light of his experience, knowledge, characteristics and ofttimes the frame of mind he happens to be in at the time a problem is presented. Sometimes the problem is solved to best advantage. Often, in the rush and hurry incident to the discharge of his manifold duties, the solution reached is not the best that might have been made.

He makes mistakes, but who does not? He does not welcome, under these circumstances, a proposal that he shall undertake a course of instruction in how to discharge properly the duties and responsibilities of foremanship.

What he does want is unqualified support from those to whom he is responsible; a better understanding of what is in their minds; friendly criticism, helpful suggestions and, above all, practical aid in the solution of problems frequently occurring which are perhaps foreign to his knowledge and experience, or the ramifications of which extend to other departments over which he has no jurisdiction.

The Medium for Assisting the Foreman

Here enters the medium through which help may be given him. Some plant official may be selected for this task or some neutral individual may be engaged especially for the purpose, but there must be authorized by management a recognized official, in whom all will have confidence, whose task it is to clarify the industrial atmosphere, to knit the component parts of the organization closer together and to bring about the utmost degree of understanding and cooperation.

When and How to Introduce a Training Plan

In the course of this proceeding the foreman, and, in fact, every one of the staff from management down, may be confronted with a need for acquiring greater knowledge than they already possess on some one or more features of their duties.

When this need for knowledge is voluntarily recognized, an opportunity is automatically presented to guide the individual into the right path and to provide for him, if necessary, a ready means for acquiring that which he seeks.

Before any plan of this character can be put into effect, management, which is directly responsible for the conduct of plant affairs, must be "sold" in regard to the need for such activity in a particular plant, the fundamental soundness of the plan proposed, the probability that it will function smoothly, that it will be properly received by those members of the staff in

(*Concluded on page* 1834)

*Commissioner Canadian Founders' and Metal Trades' Association, Toronto, Ont.

J. A. Farrell Heads Steel Corporation

Made Chief Executive Officer as Successor to Judge Gary—J. P. Morgan Chairman of Board and Myron C. Taylor of Finance Committee

JAMES A. FARRELL was formally made the chief executive officer of the United States Steel Corporation at a meeting of the directors held on Tuesday afternoon, Dec. 27, thus becoming the successor in that capacity of the late Elbert H. Gary. This action was in line with the expectations of leaders in the steel trade, whether executives of independent steel companies or of the Steel Corporation subsidiaries, and had been forecasted for several months by men nationally prominent in finance and industry. It was well known, in fact, that the delay in announcing changes in Steel Corporation personnel consequent upon the death of Judge Gary was due to pending decisions relative to chairman of the board of directors and chairman of the corporation's finance committee.

Chairman of Board Not an Executive Officer

The announcement made by the board of directors after its meeting of Tuesday was as follows:

"The chairman of the board is no longer an executive officer of the company.

"James A. Farrell continues as president of the corporation and becomes its chief executive officer, under the direction and supervision of the finance committee and the board of directors.

"John Pierpont Morgan becomes chairman of the board and Myron C. Taylor becomes chairman of the finance committee."

By-Laws as Changed Give Primacy to President

While the announcement does not say so, it is evident that the board of directors amended the by-laws of the corporation, as it has power to do this at any meeting by a majority vote, provided notice of intention to amend is given at the next preceding meeting, or without such notice, by a vote of two-thirds of all the directors.

The by-laws heretofore provided that "the chairman of the board of directors shall be the chief executive officer of the corporation and, subject to the board of directors and finance committee, shall be in general charge of the affairs of the corporation." As just amended, the by-laws make the president the chief executive officer of the corporation, who, "subject to the finance committee and the board of directors, is in general charge of the affairs of the corporation."

The Logical Head

As was said in these columns last August, when the question of the succession to Judge Gary was discussed, Mr. Farrell's performance as president covering more than 16 of the most momentous years in the history of the American steel industry, made him logically the next executive head of the corporation, whatever disposition might be made of the chairmanship of the board of directors. It was further pointed out in that statement that the steel trade's problems of the future would be those of markets and prices, of relations with competitors, of new uses for steel, of the expansion of the Steel Corporation's producing capacity and of the extension of its foreign trade. In respect to all these important concerns Mr. Farrell's equipment has made him by common consent a commanding figure in the industry.

Nothing in connection with the Steel Corporation's dissolution suit was more commented upon than his nine days' testimony, which ranged over every phase of the steel industry, nationally and internationally considered, and all the ramifications of uses of steel products and of commerce in them in every quarter of the globe. His powers of memory, as tested in that long examination, were shown to be extraordinary.

From Mill Worker to President

"Work" is the word that throws most light on the success of the new chief executive of the Steel Corporation. By incessant application to his vocation he has made it his avocation. A doer, a builder, he has had pride of workmanship in what he has created. Rising step by step from the lowest to the highest rung in the ladder, he has learned the value of thoroughness in solving the problems of production and distribution in the country's greatest manufacturing industry. A master of detail, by that very token he has been able to cope with broad questions of business policy. His long experience both in subordinate and in higher executive positions has given him an unusual insight into human nature and has brought into full development his natural talents for leadership.

Having entered the employ of the New Haven Wire Co., at New Haven, Conn., at 16, Mr. Farrell was literally educated in the school of work. In the historical collection of the American Steel & Wire Co. at Worcester, Mass., is a photograph of employees of the New Haven Wire Co., taken in 1881. Young Farrell, then a wire drawer 18 years of age, appears in this picture, which shows a typical group of mill employees of that time when welfare work and safety appliances had small place in the nomenclature of steel. He had various mill experiences in the next dozen years. Going to Pittsburgh in 1888, he was employed by the Pittsburgh Wire Co., and in 1894 was appointed general manager of that company, which had a plant at Braddock, Pa., producing rods, wire and wire nails. This was later taken over by the American Steel & Wire Co.

A Penchant for Foreign Trade

In 1899 Mr. Farrell became foreign sales manager for the American Steel & Wire Co. His activities in extending that company's trade abroad led to his election in October, 1903, as president of the Steel Corporation's export company, now known as the United States Steel Products Co. His career in that capacity was marked by the steady extension of foreign markets for American steel products. Since in the formation of the Steel Corporation the creation of a larger market abroad for American steel was an outstanding aim, Mr. Farrell's success in that endeavor naturally brought him prominently into consideration when William E. Corey resigned as Steel Corporation president. J. P. Morgan and H. C. Frick, as well as Judge Gary, found their minds meeting in the choice of Mr. Farrell, and on Feb. 1, 1911, he became the Steel Corporation's president.

The success of the export arm of the Steel Corporation is testimony to Mr. Farrell's far-sighted pioneering. In 1903, when he was made head of what was then known as the United States Steel Products Export Co., American exports of iron and steel totaled slightly more than 300,000 tons. In 1916 the foreign shipments of the Steel Corporation alone aggregated 2,463,922 gross tons. With "an infinite capacity for

taking pains," Mr. Farrell became thoroughly conversant with commercial practices, competitive relationships, freight rates, duties and steamship service affecting the steel trade in all parts of the world.

In these world trade contacts Mr. Farrell's early training in the Carnegie era of rough and ready competition did not prevent him from recognizing that a spirit of conciliation and cooperation is prerequisite to more stable conditions in the steel industry. The plea for enlightened competition which found such a prominent place in the program of the American Iron and Steel Institute this last fall is but a repetition of what Mr. Farrell stressed in a paper entitled "Foreign Relations," which he presented at the October meeting of the same body in 1910.

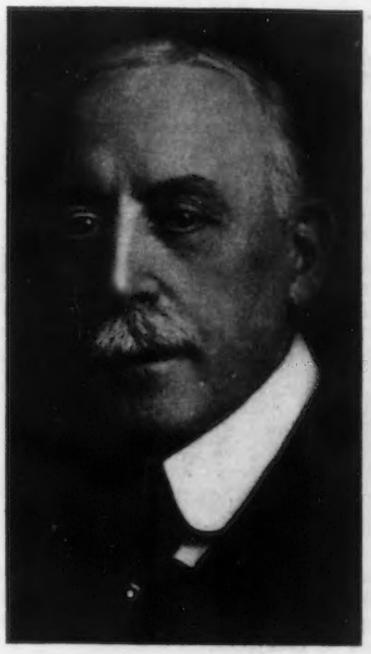
An eminently practical man and accustomed to the active direction of sales policies, Mr. Farrell was among the first to see beyond the immediate advantage of a given order to the general effect on business as a whole. All of his work has been characterized by an earnestness and a thoroughness calculated to penetrate a given problem in its broadest aspects. Unsatisfied when work is undone, he has been known to remain at his desk for 15 hours in a day. His rugged constitution has enabled him to carry out these self-imposed tasks.

Too engrossed in his life work to seek the limelight, Mr. Farrell is nevertheless an outstanding figure in those activities which have especially appealed to him—shipping and world trade. As head of the United States Steel Products Co. he became the best known of American steel manufacturers to the heads of the industry abroad. He has retained his active interest in export trade as president of the Steel Corporation and as chairman of the Foreign Trade Council in all its 13 years. In an editorial review of the seventh foreign trade convention in San Francisco in May, 1920, THE IRON AGE said of his leadership as demonstrated at that memorable meeting: "President James A. Farrell has been to this movement what Judge Gary has been to the American Iron and Steel Institute."

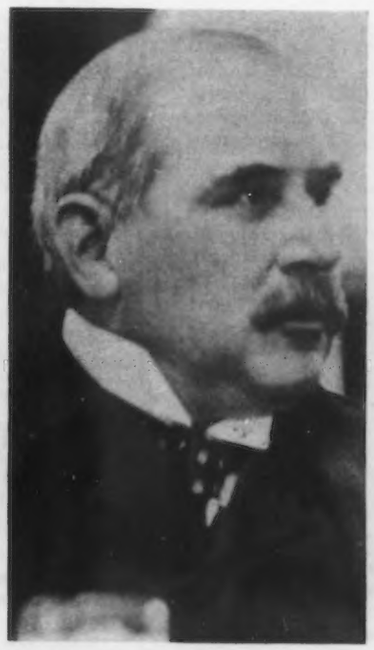
On a pedestal in his office is a large globs—an appropriate reminder of the world-encircling trade that he built up. Nor has he forgotten his humble beginnings as a workman in the mills. He takes pride in the apprenticeship of hard manual labor that proved the foundation of his subsequent success, and he has a fraternal feeling toward all of the thousands of workmen under his direction.

Mr. Morgan Is Chairman of the Board

John Pierpont Morgan, the second of the name, succeeded his father as the head of J. P. Morgan & Co., the well known banking institution. He was born in Irvington, N. Y., in 1867, and was educated at Harvard University. He was associated with his father in large financial affairs for years prior to the latter's death in 1913, the two being known to business associates as "Senior" and "Junior." The part that Morgan Senior took in the organization of the Federal Steel Co., the National Tube Co. and the United States Steel Corporation has been told many times. Notwithstanding the fact that the elder Morgan was on the directorate from the formation of the corporation, and the present J. P. Morgan since May 25, 1909, they appeared very little in the public eye as taking an influential part in the steel trade. Mr. Morgan has never sought publicity—quite the reverse; this and the attention which must be devoted to the other important interests of the banking house have kept him in the background of the Steel Corporation's affairs. The late Judge Gary, however, freely said that there were certain questions upon which Mr. Morgan's advice was always asked and on which his decision was influential.



JAMES A. FARRELL
President



J. P. MORGAN
Chairman of Board

MYRON C. TAYLOR
Chairman Finance Committee

Myron C. Taylor, Chairman of Finance Committee

Myron C. Taylor, who has been chosen chairman of the finance committee of the Steel Corporation, was elected a member of that committee in September, 1925, ex-Gov. Nathan L. Miller of New York being elected a member at the same time, as well as general counsel of the Steel Corporation in succession to R. V. Lindabury. Mr. Taylor is attorney and corporation executive, among the companies he has long represented being a number in which First National Bank interests have been prominent. He was born in Lyons, Wayne County, N. Y., Jan. 18, 1874, and is a direct descendant of John Taylor, Puritan colonist, who settled in Massachusetts in 1660, and of Capt. John Underhill, one of the earliest military leaders of the American colonies, who was a native of Stratford-on-Avon, England. Captain Underhill came first to Massa-

(*Concluded on page* 1824)

BOOK REVIEWS

The Story of Chemistry, by Floyd L. Darrow. Pages, 528; 49 illustrations. Published by the Bobbs-Merrill Co., Indianapolis, Ind. Price, $4.

Books like this which dwell on the spectacular, the new, the bizarre, the stupendous, the impossible, leave the reader gasping for breath. "Can such things be?" he cries. "Oh, my gosh!"

Such books of course are written for casual readers who may desire to acquire a little information about the trend of recent science. It is to be doubted, however, whether it is necessary to "jazz" up the subject to such an extent. A special attempt to select striking, "human-interest" aspects of science, or items reported only yesterday in the daily press, will inevitably lead to a distorted picture of the entire field. Really important discoveries (in years gone by) of the humdrum type will be unmentioned. Others of more than doubtful merit will be given prominence because headlined only recently.

This warped perspective is responsible for such statements as found on page 343, that the probable period of exhaustion of copper ores is 11 years and of zinc only 20 years—statements that lead one to doubt the author when he insists, for example, that it is necessary for the chemist to discover quickly some way of getting aluminum from clay.

The reviewer read only those chapters applying to metals. Skimming through the rest of the pages leaves the impression that the entire book is cast in one mold. While it is unfair to pick out isolated mis-statements when passing judgment, still the following may be taken as representing much of the spirit of the book: "X-ray examination of the alloys entering into air-ship construction may in the future make impossible disasters such as befell the ill-fated Shenandoah!"

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Medical Care of Industrial Workers. Published by the National Industrial Conference Board, 247 Park Avenue, New York. Pages, 112, 6 x 9 in., 20 tables. Price, $2.

This book contains the results of an investigation conducted in 501 industrial establishments which employ over a million workers in various lines of activity. It was prepared by Dr. F. L. Rector and assistants of the Industrial Conference Board's research staff under the supervision of the board's staff economic council. The board has published other books dealing with particular phases of medical work in industry, but the present work differs from them in attempting to give a more general survey and summary of the organization, methods and accomplishments of industrial medical work up to date.

Of particular interest in the first chapter, "the Relation of the Physician to Industry," is a list of the primary activities in which medical departments in industry may engage. They are: the physical examination of workers and applicants for jobs, the treatment and redressing of injuries, the diagnosis and treatment of minor medical cases and advice on medical problems, the sanitation of workshops and the maintenance of proper factory working conditions and health education and accident prevention. It can readily be seen that the cost involved in a complete adherence to this program would be prohibitive in small plants, but the results of the investigation show a surprisingly large number of companies which are able to carry on this work in part, at least.

The chapter on "Industrial Accidents and Their Treatment" contains a fine bit of concise instruction for dissemination in a small plant where systematized medical supervision is impractical. Another chaper of considerable practical interest deals with staff and equipment. Included are lists of necessary equipment and plans for staff arrangement.

Unusual light on the progress of different industries in the medical care of their workers is offered by the various tables presented. The iron and steel industry leads all others in the number of physicians and nurses employed. In the 30 plants reporting, 54 full time physicians were employed with 35 on part time and 35 on call. These plants also employed 133 full time nurses and a staff of 85 technical and clerical assistants. In the automotive industry the 25 plants reporting employed 18 full time physicians, 15 on part time and 50 subject to call, 98 nurses and a staff of 63 technical and clerical assistants. In the various other metal trades 148 plants reported 38 full time medical supervisors, 90 on part time and 233 subject to call, and a total of 206 nurses.

The tables also showed the average cost per employee of medical service in industry to be $5.15. The cost in the iron and steel industry was $6.11, in the automotive, $4.18, while in the other metal fields it ranged from $3.70 to $7.11. Ordinarily, as further tables show, the greater part of this cost went for salaries of medical employees.

Appendices at the end of the book provide methods to follow in making routine physical examination of both male and female applicants for employment, an outline of standard first aid treatment of injured persons and a standard physical examination procedure.

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Industrial Turmoil—A Story of New England. By Fred B. Jacobs. Pages, 296, 4¾ x 7¼ in. Published by Burton Publishing Co., Kansas City, Mo. Price, $2.

Works of fiction do not fall within the scope of THE IRON AGE'S book review columns; but in this case the author is editor of *Abrasive Industries*, Cleveland, and his story has much to do with the labor side of a machine shop and foundry operation. What calls for comment here is that the author is true to life in the shop and trade settings of his story—something that cannot be said of so much that wins commendation from novel-readers for its high coloring of industrial conditions. Mr. Jacobs worked for 10 years as a machinist and industrial foreman and commands the vernacular with accuracy and fluency.

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A Geographical Study of Coal and Iron in China. By Wilfred Smith, with an introductory note by Prof. P. Roxby. Pages 83, diagrams 7. Published by the University Press of Liverpool. Price, 5s.

On the whole, this volume is a desirable contribution to geological and mining literature, showing, as it does, the principal sources in China of the two most important minerals in the world today. It just happens that general attention is being drawn to the vast Asiatic area, peopled by 300,000,000 (some say, 400,000,000) individuals, potential customers of many things made by outside "barbarians," and which up to date has not made proper use of its immense exporting potentialities.

Just what foreign country shall profit most by aiding the Chinese to get rich instead of merely busy, by the development of these subterranean riches, at present lies in the lap of the gods. A stupid consul general or a hasty admiral may tip the scale one way or another, as far as non-Chinese as well as Chinese are concerned.

In any case, it is interesting to know that in China there is not only bituminous coal but also anthracite literally "to burn," and this little book points out just where, although not in what quantities, nor exactly how economically exploitable they lie, and that in many instances they are to be found near the various kinds of iron ore, from Archean to contact metamorphic and other.

The British Geological Survey estimates the Chinese coal reserve as 2345 million tons, but Drake figures about 96,618 millions, so we have very little accurate information as to quantity. Geologically and industrially we are but little better off, as up to comparatively recent years mining ceased when the water table

was pierced (just as happened in medieval Britain) and just at what depths this occurs in the various coal and iron districts no one knows, as yet.

It is significant that, in spite of the cold Chinese winters, many districts in that country have for centuries relied on dried grass and dried roots as fuel, while in others, South Shansi for instance, coal is plentiful, widely dispersed and easily worked, that no internal trade has developed. As to the iron ores, which are often hematitic and limonitic, hence richer than the carbonate ores normally associated with coal mines, the deposits are thin and unsuited to modern large-scale mining methods.

A valuable bibliography and a good alphabetical index add to the worth of this book. R. G.

—

Metallurgist's Manual. By T. G. Bamford and Harold Harris, lecturers in metallurgy, University of Birmingham. Pages 246 + x, 55 illustrations. D. Van Nostrand Co., New York. Price, $5.

About half the book is devoted to brief instructions on the analysis or physical examination of all sorts of ores, fuels, refractories, slag and metal products. Elements of pyrometry and metallography occupy the remainder, together with tabular matter. Obviously the book is for a practitioner to use, not in connection with his routine work, but as a handy place to find now and then a workable method for doing something out of the ordinary.

It is printed by the Aberdeen University Press in Scotland, on excellent, heavy weight, book paper, and in a particularly legible old-style type face. The printer has done his part to make a friendly book which invites the reader in a way seldom equaled by American makers of technical books.

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Vacations for Industrial Workers. By Charles M. Mills. Pages, 328, 5½ x 8¾ in. Published by the Ronald Press Co., New York. Price, $5.

This volume, the first of a much-needed series of research studies on human relations in industry, covers the question indicated by the title, for the whole industrial world, and evokes surprise at the general acceptance and carrying out of the idea. It aims to show the historical development of the vacation movement, gives the main provisions in plans of individual concerns, as well as in those in collective agreements and legislation; and makes clear the social and economic results of the vacation movement.

It is a large program, calling for an immense amount of work, collecting data in many languages (27 countries contribute material), while the diverse form and arrangement in which these data are presented necessarily increases the difficulty of collation and comparison.

The various contributors of material give their impressions in Part I, Parts II and III being devoted to factual data and information.

It is difficult to judge of the value of this work, as it depends not merely on the mass of material but upon its correctness; and of the latter the reader has slight means of judging.

Civil Aeronautics in Great Britain

The trend in development of civil air transportation by the United Kingdom has been toward international and inter-Commonwealth, rather than national air services. The success of this type of transportation was not assured until the formation of the British Airways, Ltd., in 1924, which receives an annual subsidy from the Government of $685,000.

During the summer of 1927 there were in regular operation by Great Britain about 2500 miles of air routes. In 1926, 4777 machine flights were made on regular services. These craft covered 840,000 miles, carrying 16,775 passengers and 679 gross tons of cargo. The value of commercial goods transported by air across the English Channel in 1926 amounted to nearly $10,000,000.

New Books Received

Machine Work. By Theron J. Palmateer. Pages 202, 5½ x 8 in., illustrated. Published by Stanford University Press, Stanford University, Cal.

Transactions American Society of Heating and Ventilating Engineers. Pages 362, 6 x 9 in., illustrated. Issued by the society at 29 West Thirty-ninth Street, New York.

Iron and Steel Institute, Carnegie Scholarship Memoirs, Vol. XVI. Edited by George C. Lloyd. Pages 210, 5½ x 8½ in., illustrated. Published at the offices of the institute, 28 Victoria Street, London, S. W. 1, England.

Journal of the Iron and Steel Institute, Vol. CXV. Edited by George C. Lloyd. Pages 1082, 5½ x 8½ in., illustrated. Published at the offices of the institute, 28 Victoria Street, London, S. W. 1, England.

Journal of the Institute of Metals, Vol. XXXVII. Edited by G. Shaw Scott. Pages 886, 5½ x 8½ in., illustrated. Published at the offices of the institute, 36 Victoria Street, London, S. W. 1, England.

Condensed Catalogue of Mechanical Equipment, Vol. XVII. Pages 1006, 8¾ x 11½ in., illustrated. Published by the American Society of Mechanical Engineers, 29 West Thirty-ninth Street, New York.

Index of Patents. 1926. Pages 1922, 7½ x 10¾ in. Issued by the United States Patent Office, Washington.

Record of Industrial Accidents in the United States to 1925. Pages 113, 5¾ x 9 in. Issued by the Bureau of Labor Statistics, United States Department of Labor, Washington.

Workmen's Compensation Legislation of the United States and Canada as of July 1, 1926. Pages 687, 5¾ x 9 in. Issued by the Bureau of Labor Statistics, United States Department of Labor, Washington.

Anleitung zu Genauen Technischen Temperaturmessungen. By O. Knoblauch and K. Hencky. Pages 174, 5¾ x 9 in., illustrated. Published by R. Oldenbourg, Glückstrasse 8, Munich, Germany. Price, 12 m.

Bergwirtschaftliche Tabellen zur Weltlagerstättenkarte. Issued by the Prussian Geological Survey Office. Pages, 312, 6 x 9 in., illustrated. Published by Dietrich Reimer, Wilhelmstrasse 29, Berlin, S. W. 48, Germany.

Autostähle des Welthandels. By Albert Müller-Hauff and Karl Stein. Pages 195, 6 x 8¼ in., illustrated. Published by Stahleisen, Breite Strasse 27, Düsseldorf, Germany. Price, 9 m.

Handbuch des Eisen und Stahlgiesserei. Second edition. Edited by C. Geiger. Pages 584, 8 x 11 in., illustrated. Published by Julius Springer, Linkstrasse 23, Berlin, W. 9, Germany.

Booklet on Japanese Industry

"The Industrial Transition in Japan" is the title of a 51 page booklet bound in boards, which has been published by the National Research Council and the Japan Society. It is by Maurice Holland, director of the Division of Engineering of the National Research Council, and is a condensed report of his investigation of the industrial situation in Japan, made while attending the Pan-Pacific Science Congress as a representative of the United States Government and the council. The booklet contains chapters on pearl culture, fisheries, industrial research, civil aviation and the silk industry.

Reduced Demand for Anthracite

Speaking for the anthracite industry in the December *Mining Congress Journal*, E. W. Parker, Philadelphia, director of the Anthracite Bureau of Information, estimates that anthracite production in 1927 will be less than that of 1926 by between two and three million tons. It is impossible to estimate how much of this loss is due to the use of substitute fuels, such as bituminous, coke and fuel oil, the use of which has been encouraged by high anthracite prices, caused by increased labor costs, excessive taxation, high cost of transportation and strikes. The Pennsylvania tax on anthracite production has hampered efforts of producers to regain markets in New England and elsewhere which were lost in the last strikes.

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This Issue in Brief

Labor-saving machinery will not put a brake on prosperity so long as workers are paid in proportion to their greater productiveness, Secretary of Labor declares. Purchasing power would be killed by reducing wages, he says.—Page 1831.

Considerable tact is needed in introducing a foremen-training program. If foremen get the impression that they are to be "instructed" their antagonism will be aroused. But if the program is presented in the light of an aid to them in overcoming difficulties, they will cooperate.—Page 1834.

Lion's share of hand tool sales to South America goes to United Kingdom. The U. K. sold 32 per cent, United States 31 per cent, and Germany 27 per cent of imports in 1925. While this is still a price market, the demand for quality is increasing, favoring United States.—Page 1830.

November automobile output was lowest in four years. Only 133,202 cars and trucks were produced. The total for first 11 months is 21 per cent below same period of 1926.—Page 1832. Dr. Haney predicts a strong recovery in the spring.—Page 1794.

Freight rate concessions on steel for export would stimulate export business, say steel producers. Urge Commerce Commission to permit railroads to grant special rates. But Eastern producers oppose reductions.—Page 1835.

Staybolts made of 2 per cent nickel steel said to be most durable. Tests made in laboratory and under actual working conditions prove that this alloy has the best combination of qualities for staybolt service, declares nickel producer.—Page 1785.

Market conditions are ready for improvement, says Dr. Haney. Commodity supply on the average has been reduced, while demand has remained strong. Under such conditions both buying and production normally will increase.—Page 1793.

Output increased 23 per cent by installation of conveyor. Buick engines are now carried 1½ miles from motor test room to car assembly plant by a chain-type conveyor, operated by 10-hp. motor.—Page 1784.

To save industry the effort and expense of training industrial metallurgists, college establishes a course in metallurgy emphasizing the uses of metals, rather than their production. Michigan State College designs new curriculum to meet the new demand for men with this training.—Page 1779.

Relative efficiency of different rolling mills can be calculated accurately by allowing for variables. Comparing actual production with a theoretical maximum gives a coefficient which is a true measure of performance.—Page 1781.

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100 per cent increase in strength of bronze-welded cast iron pipe joints is claimed for new type shear vee joint. Breaks are declared to be practically eliminated, and in addition, the new design is cheaper.—Page 1782.

Malleable foundry output in November was lowest of any month in 1926 or 1927. Operations were at the rate of 40.5 per cent of capacity. Production for first 11 months was 18 per cent under same period of 1926.—Page 1831.

"No violation of anti-dumping act," Treasury Department rules in German steel import case. However, "the entire situation will continue to be carefully watched by the Government."—Page 1833.

Any expansion in business will bring a strain in bank credit, Dr. Haney believes. "Insofar as industrial activity and earnings are concerned, the fundamental conditions are predominantly favorable and an early recovery is indicated. The financial position, however, is less favorable."—Page 1792.

Nitrogen content of steel can be determined by fusing the sample in a graphite crucible. The evolved gases are passed through calcium vapor, forming calcium nitride, which is converted into ammonia by hydrochloric acid. The ammonia is then determined by volumetric analysis.—Page 1832.

Steel exports gained in November. Gross tonnage was 177,928, an increase of 4.5 per cent over October. Steel imports gained 18 per cent.—Page 1832.

Be doubly careful in phrasing an order for foreign supplies, if you do not know the seller. Purchasing Agents' Association warns buyers against intentional confusion of feet and meters, French francs and gold francs, etc., by unscrupulous sellers with resultant loss to buyers.—Page 1802.

Wholesalers are apparently free of the sharp fluctuations in business with which manufacturers must contend. During the nine years since the war the physical volume of wholesale trade has been remarkably steady.—Page 1803.

ESTABLISHED 1855

THE IRON AGE

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Who Will Rescue the Next Submarine?

NOW that the nation has spent its gruesome death-watch, as the life in the sunken submarine S-4 slowly suffocated, and the harrowing event softens with passing days, it is proper to turn sober thought toward what can be done to prevent these tragedies. They happen often enough, even to the peace-time navies, to recruit that large body of civilized public opinion which, having in mind the misdeeds of the great war, would outlaw submarines, along with poison gas and other atrocious devices.

But doubtless the submarine has come to stay. If this be so, one wonders why so little provision is made for serious accidents. They happen at intervals to every type of machine, everywhere. Common humanitarianism demands that unfortunate humans in such disasters be given every help, and every chance to help themselves. Railroad accidents are infrequent, but what railroad is without adequate wrecking equipment, manned in constant readiness to be at the scene within a few hours? Aircraft accidents are less infrequent than they were once, but even in those war days when the flying cadets were learning to manage "grasshoppers," the field always possessed a "meat wagon"—that little Ford with a red cross painted on it—ready to hurry to any unlucky one. Commercial vessels are almost 100 per cent safe, but they never neglect to install a wireless, and take along life boats; even a battleship has small boats and catamarans on deck except when stripped for action.

But the poor fellow in a submarine is just out of luck if anything goes wrong with his highly organized craft. Even if it sinks in comparatively shallow water, close to his home port, he will die of suffocation before his ship can be raised. He can't get out until the ship is up, and the navy has inadequate wreckers, and is either too penny-wise or too bound with red tape to call for help from competent and experienced companies doing salvage work for water-borne commerce.

When no compartment is equipped with ports in which air lines can be readily socketed and then be opened from the outside, can the submarine be well designed? When it takes the best part of 24 hours to collect together essential equipment at Brooklyn and then crawl toward the wreck at six miles per hour, can the navy be prepared? When the wreck, once located, was marked by just one buoy, which later drifted off, can the handling of the situation be called adequate? When no oil was used to calm a choppy sea and permit diving operations, can the rescuers be said to have done their utmost?

The navy now asks the American people for three-quarters of a billion dollars to build new ships. There may be question whether this bill should pass. On the other hand, Congress could find no ground for opposing a bill to give our naval bases adequate wreckers—big, fast, seaworthy ships, equipped with every known device for work under water, manned ready for a quick errand of rescue.

If we must have submarines, let us give the sailors a chance.

Fighting Unfair Sales Practices

A BULLETIN of the National Association of Purchasing Agents, whose 5000 members represent the buying of a very large part of American manufacturing industry, urges that when a manufacturer places a trial order with any foreign concern not thoroughly known to him he insist that the total amount of the order, including delivery and every other expense, be plainly stated in terms of dollars. The warning is based upon complaints already referred to in THE IRON AGE. These were filed by members of the association and others against thirteen foreign and nine domestic firms which, it is alleged, are using questionable methods.

The goods sold are in most instances of foreign origin. It goes without saying that most foreign houses doing business with the United States, directly or through representatives, are four-square in their dealings. But such foreign firms as are willing to secure business by trickery have an advantage in the intricacies of foreign

currency and exchange. For instance, a salesman in his attempt to get an order, talking in terms of francs, may lead his prospect to think in terms of French francs, valued at 25 to a dollar, when his bill will read Swiss gold francs, worth five to a dollar. He also talks indiscriminately in meters and feet, always with the idea, evidently, of leaving the "feet" impression, which, however, disappears when the bill is presented.

In some cases the reading of an order is made ambiguous. One order was placed for "12 file bodies, 12 in., 14 in., 16 in. assorted—30 file blades interchangeable for each body in rough, in second cut and in smooth." To quote the bulletin, the bill showed that the customer had unwittingly ordered "nothing less than 30 file blades for each file body, 360 in each of three sizes and three distinct types—in short, 3240 files and 36 bodies, and the invoice came in for approximately 45,000 gold francs, or $9,000 in American money, where it was believed only about $30 worth was being bought."

This, of course, was an extreme case. Doubtless the buyer, after receiving the invoice containing an extra charge for delivery, and the goods (which, by the way, were delivered to the company's shipping door by an outside truckman), became one of those who have flatly refused to pay. Such refusal, naturally, is not uncommon. The Association of Purchasing Agents is waiting for one of the sellers in such a transaction to go beyond offer of compromise and carry a case into the courts. Then, it is stated, a test case will be made and fought to a finish, to establish the rights of a buyer under these dubious conditions.

Greater British Consumption of Steel

GREAT BRITAIN'S dwindling exports and heavily increased imports of iron and steel products have been attributed generally to the upset condition of industry in the British Isles. Another explanation, however, calls for consideration. A statement prepared by the American commercial attaché in London refers to the 1913 monthly production of steel ingots and castings in Great Britain, amounting to 639,000 tons. Adding imports and deducting exports leaves about 411,000 tons monthly for domestic consumption. A similar calculation for the first nine months of 1927 shows an increase in production by about 150,000 tons a month, with imports more than doubled, while exports fell off almost 20 per cent. The net result gave 838,000 tons a month as the estimated consumption within the British Isles.

Some commentators have stated that this doubling of the apparent consumption in Great Britain has been due to the necessity to make up for the short rations on which the country was subsisting during the coal strike of 1926 and the consequent virtual stoppage of iron and steel manufacture. If, however, we take the average of figures for 1926 and 1927, the apparent domestic consumption is approximately 600,000 tons a month. This shows a gain of 47 per cent above 1913 and of about 10 per cent above the average of 1924 and 1925, both of which were much higher than either 1913 or 1923. Thus, the theory of making up for lost months is not a sufficient explanation of the apparent heavy consumption.

It is to be noted that every one of the four most recent years shows a much heavier import tonnage than did 1913, and every one of them shows a much reduced export tonnage, compared with that year. Imports have advanced from 202,000 tons a month in 1924 to 389,000 tons a month in 1927. Even compared with the strike year 1926, the 1927 imports show an increase of 25 per cent.

Among the developments in Great Britain in recent months is a large increase in the demand for fabricated structural steel, for railroad material and equipment, for pipes and tubes, and for steel required in the manufacture of automobiles, electrical machinery and other types of equipment. Plates and sheets have been in poor demand—probably not greater than in 1913—so that, in the absence of a definite survey, the items enumerated above must be credited with the principal share in the increased British consumption.

Steady Wholesale Trade

IN physical volume wholesale trade has been remarkably steady since the war. This is brought out by study of a new index of wholesale distribution just completed by the Federal Reserve Board and given at length in the December *Bulletin*. The class of trade covered takes in such commodities as are distributed by wholesalers to retailers for sale to individuals. In the order of their prominence the lines presented are: Meats, groceries, dry goods, hardware, boots and shoes, drugs, furniture, women's clothing and men's clothing.

The object of the Federal Reserve Board in devising this index was to serve banking and accordingly dollar volume alone is considered. Tables and charts cover the period since Jan. 1, 1919. The weighted composite of all wholesale distribution, adjusted for seasonal variation, shows rather wide fluctuations in the nine-year period. We have compared the curve with the record of commodity prices at wholesale and have found a remarkable harmony between the two, showing that the physical volume of this trade was relatively constant. Wholesale distribution, by the dollar measure, mounted very high in 1919 and declined still more in 1920, being low in 1921 and increasing in 1922. From early in 1923 to the present time there has been an almost steady but very slow decrease except for a dip in the middle of 1924.

In the general volume of business activity there were very wide fluctuations after the war and to early in 1923, since which time there have been smaller, and yet important, fluctuations. The wholesale trade here referred to is included in such general indexes as freight car loadings and bank debits and tends to flatten out in the general showing the fluctuations in building, in the manufacture of equipment, in the purchases of raw material by various manufacturers and in other forms of trade activity.

The people at large have been prosperous, and the showing is that they have been rather uniformly so during this nine-year period. There

has been no similar period of uniformity in the past, unless just after the Civil War, and that was a few months short of nine years. Precisely how prosperous the people have been is not the point in this connection. It is the uniformity that is here indicated.

Manufacturers have not had similar uniformity in their prosperity. Their earnings have been tending to decrease, and there is nothing visible in the times to effect an alteration. That will have to come from the enlightened effort of the manufacturers themselves. This means, in many cases, and certainly in the case of the steel manufacturers, better prices. The distribution is not expensive relative to the service. The steel industry has been doing retail business at wholesale prices. With the general supplies of the public, in the lines covered by the Federal Reserve Board study here discussed, the same quantities could be secured at much less outlay if the retailing system were not so expensive.

Coal Trade Rehabilitation

NOW that the bituminous coal strike or suspension, what there was of it, has been left so far in the past, trends in the direction of rehabilitation may be considered. Through all these recent years in which the United Mine Workers has striven for an unnatural wage scale in the remaining fields it controlled, the bituminous coal producing capacity has been increasing, while on account of improvements in the use of fuel the requirements have increased but a trifle or not at all. Bituminous coal production in the year now ending is approximately 520,000,000 net tons, which is equal to the 1925 production and is under that of five years—1926, 1923, 1920, 1918 and 1917. The 1927 production is only 9 per cent above that of 1913, with an interval of 14 years.

The last event in this year's bituminous suspension was the Oct. 1 agreement for Illinois, a tentative arrangement looking to a recasting by April 1. So-called "settlements" followed immediately in Indiana and States to the west.

Studying trends, one may compare production in the last two weeks of September, therefore, with recent production, to observe changes produced by the Illinois and other settlements. In the States of interest the comparison is as follows, between average weekly rate in the two weeks through Oct. 1 and average weekly rate in the two weeks through Dec. 10:

Bituminous Coal Production, Weekly Rates

	Late September, Net Tons	Recent, Net Tons	Change, Per Cent
Illinois	219,000	1,375,000	+528
Indiana	323,000	360,000	+ 11
Eastern Kentucky	1,102,000	757,000	— 31
Western Kentucky	509,000	327,000	— 36
Pennsylvania	2,484,000	2,294,000	— 8
Southern West Va.	2,326,000	1,600,000	— 31
Northern West Va.	867,000	708,000	— 18
Total	7,830,000	7,421,000	— 5
All other	2,135,000	1,949,000	— 9
Grand total	9,965,000	9,370,000	— 6

In a period of the year when ordinarily the production of coal increases in marked fashion, there has been an actual decrease, 6 per cent in the fortnight ended Dec. 10 compared with the fortnight ended Oct. 1. This is due to the attitude of buyers changing, following the Illinois settlement, stocks being drawn upon more freely.

There was a wholesale rearrangement, the Southern fields, West Virginia and Kentucky, losing both by the general loss and by the Illinois and Indiana increases. Pennsylvania, long non-union in certain areas and lately open shop in the remaining districts, almost held its own with the country at large, losing 8 per cent when the total loss was 6 per cent. Ohio contributed almost no production to either of the periods compared above. It has still to find a working basis on which it can compete.

With a greater excess than ever of capacity over requirements, the coal mines will be in greater competition than ever. There will be a wholesale deflation in the number of mines in the fields generally. Mechanization will proceed, on the part of the larger and stronger mines, whereby their individual capacities will increase, thus making further inroads into the small-mine class. All around the number of miners relative to production will be decreased by mechanization. The number of miners will be doubly reduced, both by there being so many idle at present and by fewer being required. This is an economic necessity. No patching up has been possible of late by conferences. The necessity has simply been aggravated by the conduct of the United Mine Workers for years past.

Coefficient of Thermal Expansion an Important Property of Materials

Knowledge of the amount by which a material expands when heated or contracts on being cooled is most important in scientific and technical work. Determination of the thermal expansion of materials is therefore a primary function of the Bureau of Standards. The equipment used in this work includes apparatus so constructed that changes in the length of a sample with change in temperature may be measured, although the sample is entirely inclosed within a small furnace.

The sample of metal or other material, in the form of a rod about 12 in. long, is supported in a horizontal position inside a cylindrical furnace in such a way as to be free to change in length with changes in the temperature of the furnace. Fine wires attached to the rod near its ends extend downward through attachments on the bottom of the furnace, made of brass pipe and having oil reservoirs at their lower ends. Small weights, fastened to the wires to keep them taut, are immersed in the oil to damp out any vibration of the wires.

On opposite sides of each pipe are small glass windows. When a light is placed behind the rear window the wire can be easily seen. As the temperature of the furnace is raised the sample increases in length, and of course the distance between the wires also increases. This change in length is watched and recorded by the observer, who looks through special microscopes placed opposite each front window. These microscopes contain cross hairs which are moved across the field by micrometer screws, that changes in length may be noted.

This method measures expansion directly without reference to secondary equipment or standard material. The length of the specimen of material being tested is measured before and after the experiment by means of a very precise vernier length micrometer. The two microscopes are mounted on a small car which may be moved along a track so as to come opposite any one of the several furnaces with various ranges of temperature from 240 deg. to over 1800 deg. Fahr.

It is necessary to maintain constant the distance between the microscopes, or to alter this distance slightly by a known amount to care for considerable changes in the length of the sample. For this purpose a standard bar made of "Invar" steel, which has a low coefficient of expansion, is mounted near the furnaces, and on this the microscopes are sighted from time to time.

FABRICATED STRUCTURAL STEEL

Holiday Week Awards Nearly 24,000 Tons—Inquiries Close to 26,000 Tons

Awards of fabricated structural steel in the holiday week totaled slightly under 24,000 tons, and of the 25,750 tons added to pending work one inquiry accounts for 14,000 tons—an office building to be erected in Boston. The largest awards were 7000 tons additional material for the Cleveland Union Terminal and 4600 tons for a building at Houston, Tex. Awards follow:

BOSTON, 143 tons, office building and stores, 143 Newbury Street, to New England Structural Co.

BOSTON, 200 tons, office building, to New England Structural Co.

CAMBRIDGE, MASS., 300 tons, Jordan & Marsh Co. warehouse addition, to New England Structural Co.

BOSTON & MAINE RAILROAD, 450 tons, bridges at Lawrence, Mass., to Boston Bridge Works, Inc.

LINDEN, N. J., 700 tons, building for United States Gypsum Co., to Belmont Iron Works.

PHILADELPHIA, 1500 tons, apartment building, to Bethlehem Steel Co.

PHILADELPHIA, 500 tons, building for Broad Street Trust Co., to an unnamed local fabricator.

CLEVELAND, 7000 tons additional material for Cleveland Union Terminals Co. Prospect Avenue bridge, to Mount Vernon Bridge Works.

DUQUESNE, PA., 1600 tons, County bridge, to McClintic-Marshall Co.

PERE MARQUETTE RAILROAD, 1000 tons, grade crossing elimination work in Detroit, to American Bridge Co.

MILWAUKEE, 1400 tons, Lincoln High School, to A. F. Wagner Architectural Iron Works.

HOUSTON, TEX., 4600 tons, Jones Building, to Petroleum Iron Works, local.

HARRAH, OKLA., 700 tons, power plant for Byllesby Engineering & Management Corporation, to Mississippi Valley Structural Steel Co.

LOS ANGELES, 2500 tons, Firestone Tire & Rubber Co. plant, to Llewellyn Iron Works.

SAN FRANCISCO, 800 tons, bridge for Western Pacific Railroad, to United States Steel Products Co.

SAN FRANCISCO, 600 tons, apartment building, Leavenworth and Union Streets, to Pacific Coast Engineering Co.

Structural Projects Pending

Inquiries for fabricated steel work include the following:

BOSTON, 14,000 tons, stores and office building in Park Square district.

STATE OF VERMONT, 500 tons, highway bridges for floor rehabilitation.

NEW YORK, 350 tons, addition to Woolworth Building at Church and Vesey Streets.

WASHINGTON, 1000 tons, telephone building.

CHESAPEAKE & OHIO RAILWAY, 250 tons, bridges.

HARRISBURG, PA., 2500 tons, office building for State Capitol.

LA CROSSE, WIS., 400 tons, Hunter bridge; Wisconsin State Highway Commission closes bids Jan. 5.

WOLCOTT, COLO., 500 tons, viaduct for Denver & Salt Lake Railway Co.

FOREST GROVE, ORE., 400 tons, 12-in. pipe line; bids opened.

PORT TOWNSEND, WASH., 3000 tons, plates for pipe line; bids opened, Steel Tank & Pipe Co. low bidder on steel pipe.

MARE ISLAND NAVY YARD, 250 tons, plates; bids Jan. 3.

VENTURA, CAL., 600 tons plates, 18 to 24-in. welded steel pipe line; Claude Fisher, Los Angeles, general contractor.

LOS ANGELES, 600 tons, church on Wilshire Boulevard; bids received.

OAKLAND, CAL., 400 tons, Women's Athletic Club; Herrick Iron Works low bidder.

SAN FRANCISCO, 175 tons, plates, 20-in. pontoon pipe, United States Engineers' Office; bids Dec. 27.

CRISTOBAL, CANAL ZONE, 600 tons, Government building; bids Dec. 28.

HONOLULU, 800 tons, Alexander and Baldwin Building; bids Jan. 14.

REINFORCING STEEL

Awards of 5400 Tons and New Work Up For Bids Totals 13,750 Tons

A bridge across San Francisco Bay, which will take 8500 tons of reinforcing bars, will probably be awarded next week. This, with other work definitely in the market, totals 13,750 tons. Awards during the week were about 5400 tons, of which the largest was 1100 tons. Awards follow:

BRISTOL, R. I., 450 tons, bridge, to Foundation Co.

CAMBRIDGE, MASS., 150 tons, Jordan & Marsh warehouse addition, to Concrete Steel Co.

NEW YORK, 600 tons, subway repair shops for New York Board of Transportation, to Carroll-McCreary Co., Inc.

NEW YORK, 400 tons, foundation for United States Appraisers' Stores; from Turner Construction Co., general contractor, to Jones & Laughlin Steel Corporation.

NEW YORK, 270 tons, barracks at Fort Wadsworth, Staten Island, to Joseph T. Ryerson & Son, Inc.

BROOKLYN, 400 tons, building for E. R. Squibb & Sons, to McClintic-Marshall Co.

CINCINNATI, 250 tons, building for Young Women's Christian Association, to Pollak Steel Co.

CINCINNATI, 200 tons, Purcell High School, to Pollak Steel Co.

AKRON, OHIO, 1100 tons, sewer work, to Bourne-Fuller Co., Cleveland.

TOLEDO, OHIO, 125 tons, sewage disposal plant, to Bourne-Fuller Co.

CHICAGO, 100 tons of rail steel bars, St. Rita School, to Calumet Steel Co.

CHICAGO, 260 tons of rail steel bars, apartment building at 444 St. James Court, to Barton Spiderweb System.

ST. LOUIS, 250 tons, apartment house at Cabany and Belt Avenues, to Laclede Steel Co.

COUNCIL BLUFFS, IOWA, 600 tons, elevator for Chicago & North Western, to Olney J. Dean & Co.

SAN PEDRO, CAL., 140 tons, City Hall, to Los Angeles Iron & Steel Co.

OAKLAND, CAL., 100 tons, Women's City Club, to Frederick Steel Co.

Reinforcing Bars Pending

Inquiries for reinforcing steel bars include the following:

ROCKAWAY, N. J., 360 tons, bridge and grade crossing, route 5, section 19, New Jersey State Highway Department.

BUFFALO, 1500 tons, flour mill and elevator for Hecker-Jones-Jewell Co.; bids in Dec. 28; general contractor, James Stewart Co., Chicago.

CLEVELAND, 200 tons, Marine Hospital; bids taken.

CHICAGO, 500 tons, Lawrence Avenue pumping plant for Sanitary District.

CHICAGO, 600 tons, warehouse at Twenty-second and Fisk Streets.

CHICAGO, 160 tons, public school at Forty-ninth and St. Lawrence Streets.

CHICAGO, 160 tons, public school at Fourteenth and Kedvale Streets.

CHICAGO, 520 tons, apartment building at 1020 Lawrence Avenue.

SAN FRANCISCO, 8500 tons, bridge across San Francisco Bay at Coyote Point; award next week.

PORTLAND, ORE., 750 tons, United States Veterans Hospital; bids Dec. 29.

Upholds Intrastate Rates on Pig Iron

WASHINGTON, Dec. 27.—Intrastate rates on pig iron in Ohio do not cause undue advantage, preference or prejudice against interstate rates on that product, according to a decision of the Interstate Commerce Commission made public last Friday. The commission ordered the proceedings discontinued, bringing to an end a long-standing dispute in which shippers and consumers of pig iron complained that the Ohio rates were prejudicial against interstate rates.

The carriers in Ohio on Dec. 14, 1925, petitioned the Interstate Commerce Commission to determine whether the rates in Ohio were unreasonable when compared with interstate rates. The Public Utilities Commission of Ohio had ordered increased rates in Ohio cancelled, while it ordered the application of reduced rates. Effective Nov. 1, 1926, the carriers proposed to readjust pig iron rates throughout Central Freight Association territory, calling for both increases and reductions. Numerous complaints also were made by furnace interests in Ohio against some of the intrastate rates, which were followed by readjustments in Ohio schedules. Carriers also had complained that some Ohio rates were too low, and impaired their ability to earn a proper return and were discriminatory against interstate rates. In a detailed analysis of the situation in Ohio, the commission held that interstate traffic was not injured by the Ohio rates.

Iron and Steel Markets

Equipment Buying the Week's Feature

Orders for 11,500 Freight Cars—Specifications in Good Volume Increase Mill Operations—Larger Automobile Demand in January—Pig Iron Active at Cleveland

RAILROAD equipment buying on a scale scarcely matched in the year makes the final week of 1927 noteworthy just as it bade fair to show the usual year-end quiet. Orders for 11,500 freight cars have been placed by four roads, the Southern buying 4750, the Santa Fe 3650, the Louisville & Nashville 2150 and the Chicago & North Western 1000. The St. Louis-San Francisco has inquired for 4000 cars, and the Pacific Fruit Express is preparing to ask for bids on 2000 refrigerator cars.

Thus this year, which for weeks has looked like a leaner one than 1926 for the car shops, may run a thousand beyond the total of 67,000 for last year, including cars the railroads themselves built.

The whole trade had looked forward with lively interest to the Steel Corporation's meeting of Tuesday, and the naming of President Farrell as chief executive met the widespread expectation. Reasonable competition at home and the maintenance of this country's position in foreign trade are taken as firm planks in his platform.

Rolling mill operations in the last week in December do not signify and usually are light. But Pittsburgh, Youngstown, Cleveland and Chicago report some increase over last week. Chicago's slight gain is due to releases against 1928 rail contracts. For the Chicago district as a whole, ingot output has gone up to 74 per cent. On the other hand, the Steel Corporation closes the year with little more than a 60 per cent ingot production as an average.

The large expectations the steel trade entertains for 1928 on account of the automotive industry are emphasized again this week, but tinged with disappointment at the pace of Ford production. Spring is now the time set for reaching a good production schedule on the new car.

Bar, plate and structural shape specifications have been flowing in upon Pittsburgh and other Central Western mills in good volume for another week, and in these heavy products most makers now have a tonnage on their books that will insure good operations through January.

Rail orders just placed include 50,000 tons for the Illinois Central and 6250 tons for the Missouri-Kansas-Texas. The St. Louis Southwestern is in the market for 15,000 tons.

Structural steel awards of about 24,000 tons included 7000 tons additional material for the Cleveland Union Terminal and 4600 tons for a building at Houston, Tex. Inquiries of 26,000 tons include 14,000 tons for an office building in Boston.

Sheet specifications have been coming out in good volume for January shipment, but there is not much new business as most consumers covered before the recent advance. The National Association of Sheet and Tin Plate Manufacturers reports sales for the first half of December at 275,000 tons, bringing unfilled orders as of Dec. 15 up to 600,000 tons. It is probable that the Steel Corporation's sheet mills have done proportionately well.

Railroad car builders and agricultural works are placing some good orders for sheets, with occasionally a fair-sized release from motor car builders. Considerably more is expected from the latter in January.

A bridge across San Francisco Bay will take 8500 tons of concrete reinforcing bars, which probably will be awarded next week. Other bridge awards are looked for, but building construction is not important.

In tubular products the best demand and prospect are in pipe for gas and oil lines.

Eastern mill bases on plates and shapes, recently announced by the Bethlehem Steel Co., have been reflected in a $1 a ton reduction in c.i.f. prices on the Pacific Coast.

To the decision by the Secretary of the Treasury that German steel is not being dumped in this country is added the promise of prompt steps to protect American industry if evidences of unfair competition appear.

Cold finished steel bar extras modifying those announced in October apply an extra of 20c. per 100 lb. for lots of 2000 to 3999 lb. of a size, instead of from 2000 to 5999 lb., as in the former card. The change is made so that cold finished steel bar quantity extras will conform to those on hot rolled bars recently adopted.

Heavier buying of pig iron by the automotive industry and larger shipping orders forecast a sharp increase in motor car output. Some production foundries in Michigan are already running full notwithstanding the holiday season. Sales of foundry and malleable pig iron by Cleveland furnaces, largely to the automotive trade, totaled 45,000 tons for the week. For one producer, sales this month are the largest since June, 1925. Shipments from Cleveland are also heavy, comparing favorably with those for any previous month this year. By way of contrast, other pig iron centers are passing through the usual holiday lull.

Neither of THE IRON AGE composite prices is changed this week, that for pig iron remaining for a third week at its low of $17.54 and that for finished steel for a second week at 2.314c. a lb. The latter is about 1 per cent above its low level of two months ago.

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics
At Date, One Week, One Month, and One Year Previous

Pig Iron, Per Gross Ton:	Dec. 27, 1927	Dec. 20, 1927	Nov. 29, 1927	Dec. 27, 1926
No. 2 fdy., Philadelphia	$19.76	$19.76	$19.76	$22.76
No. 2, Valley furnace	17.25	17.25	17.25	18.50
No. 2, Southern, Cin'ti	19.69	19.69	19.69	23.69
No. 2, Birmingham	16.00	16.00	16.00	20.00
No. 2 foundry, Chicago*	18.50	18.50	18.50	21.00
Basic, del'd eastern Pa.	19.50	19.50	19.00	22.00
Basic, Valley furnace	17.00	17.00	17.00	18.50
Valley Bessemer, del. P'gh	19.26	19.26	19.76	21.26
Malleable, Chicago*	18.50	18.50	18.50	21.00
Malleable, Valley	17.50	17.50	17.50	18.50
Gray forge, Pittsburgh	18.51	18.51	18.51	19.76
L. S. charcoal, Chicago	27.04	27.04	27.04	27.04
Ferromanganese, furnace	100.00	100.00	90.00	100.00
Rails, Billets, Etc., Per Gross Ton:				
Light rails at mill	$36.00	$36.00	$36.00	$36.00
O.-h. rails, heavy, at mill	43.00	43.00	43.00	43.00
Bess. billets, Pittsburgh	33.00	33.00	33.00	35.00
O.-h. billets, Pittsburgh	33.00	33.00	33.00	35.00
O.-h. sheet bars, P'gh	34.00	34.00	34.00	36.00
Forging billets, P'gh	38.00	38.00	38.00	40.00
O.-h. billets, Phila	38.30	38.30	38.30	40.30
Wire rods, Pittsburgh	40.00	40.00	40.00	45.00
	Cents	Cents	Cents	Cents
Skelp, grvd. steel, P'gh, lb.	1.80	1.80	1.80	1.90
Finished Iron and Steel,				
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Iron bars, Philadelphia	2.12	2.12	2.12	2.22
Iron bars, Chicago	1.90	1.90	1.90	2.00
Steel bars, Pittsburgh	1.80	1.80	1.80	2.00
Steel bars, Chicago	1.90	1.90	1.90	2.10
Steel bars, New York	2.14	2.14	2.14	2.34
Tank plates, Pittsburgh	1.80	1.80	1.80	1.90
Tank plates, Chicago	1.90	1.90	1.90	2.10
Tank plates, New York	2.12½	2.12½	2.14	2.24
Beams, Pittsburgh	1.80	1.80	1.80	2.00
Beams, Chicago	1.90	1.90	1.90	2.10
Beams, New York	2.09½	2.09½	2.14	2.34
Steel hoops, Pittsburgh	2.20	2.20	2.30	2.50

*The average switching charge for delivery to foundries in the Chicago district is 61c. per ton.

Sheets, Nails and Wire, *Per Lb. to Large Buyers:*	Dec. 27, 1927 Cents	Dec. 20, 1927 Cents	Nov. 29, 1927 Cents	Dec. 27, 1926 Cents
Sheets, black, No. 24, P'gh	2.80	2.80	2.75	3.00
Sheets, black, No. 24, Chicago dist. mill	2.90	2.90	2.90	3.20
Sheets, galv., No. 24, P'gh	3.65	3.65	3.60	3.85
Sheets, galv., No. 24, Chicago dist. mill	3.70	3.70	3.75	4.05
Sheets, blue, 9 & 10, P'gh	2.10	2.10	2.10	2.30
Sheets, blue, 9 & 10, Chicago dist. mill	2.15	2.15	2.15	2.50
Wire nails, Pittsburgh	2.50	2.50	2.50	2.65
Wire nails, Chicago dist. mill	2.55	2.55	2.55	2.70
Plain wire, Pittsburgh	2.40	2.40	2.40	2.50
Plain wire, Chicago dist. mill	2.45	2.45	2.45	2.55
Barbed wire, galv., P'gh	3.20	3.20	3.20	3.35
Barbed wire, galv., Chicago dist mill	3.25	3.25	3.25	3.40
Tin plate, 100 lb. box, P'gh	$5.25	$5.25	$5.50	$5.50
Old Material, Per Gross Ton:				
Heavy melting steel, P'gh	$15.00	$15.00	$14.50	$16.50
Heavy melting steel, Phila.	13.50	13.50	13.50	15.50
Heavy melting steel, Ch'go	12.25	12.25	11.50	13.00
Carwheels, Chicago	13.50	13.50	13.25	14.50
Carwheels, Philadelphia	15.50	15.50	15.50	16.50
No. 1 cast, Pittsburgh	14.50	14.50	14.25	16.00
No. 1 cast, Philadelphia	16.00	16.00	16.00	17.00
No. 1 cast, Ch'go (net ton)	14.00	14.00	13.50	16.50
No. 1 RR. wrot. Phila.	15.25	15.25	15.25	17.00
No. 1 RR. wrot. Ch'go (net)	10.50	10.50	9.75	12.00
Coke, Connellsville, Per Net Ton at Oven:				
Furnace coke, prompt	$2.75	$2.75	$2.75	$3.50
Foundry coke, prompt	3.75	3.75	3.75	4.50
Metals,				
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Lake copper, New York	14.25	14.25	13.75	13.62½
Electrolytic copper, refinery	13.75	13.75	13.50	13.25
Zinc, St. Louis	*5.65*	5.67½	5.90	7.02½
Zinc, New York	*6.00*	6.02½	6.25	7.37½
Lead, St. Louis	6.30	6.30	6.10	7.65
Lead, New York	6.50	6.50	6.40	7.80
Tin (Straits), New York	*58.25*	58.12½	59.12½	67.00
Antimony (Asiatic), N. Y.	*11.00*	11.25	10.87½	13.25

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our market reports on other pages.

Pittsburgh

Mill Operations Improve with Continued Inflow of Specifications

PITTSBURGH, Dec. 27.—Indications still point strongly to a substantial upturn in the activities of the steel industry with the turn of the new year. The Youngstown district continues to extend its gains of the previous week, and in other parts of the greater Pittsburgh area preparations are being made for increased steel works and rolling mill operations. The holidays have interposed almost no interruption to the flow of specifications against fourth quarter contracts, and orders for prompt shipment or at the convenience of the mills have been of fairly large volume, seeing that there was no possibility of the material reaching buyers to be counted in inventories. The only disturbing feature of this business is that it is low-priced and that in some products there is a sufficient spread between the invoice prices and those now quoted to enable the jobbers to offer some competition on price with the mills. The mills, however, are getting an operation that will give them a chance to reduce their costs. It is bothering some of the trade that the business now rolling in has been slightly forced by the price situation and, consequently, must be considered more as bulge than as definitely marking a turn in consumption. There are general hopes, however, that from this beginning momentum will develop.

The week has brought out no important price changes, unless a modification of the cold-finished steel bar and shafting card issued Oct. 17 can be so considered. In a general way, the advances announced in the past few weeks are holding, particularly in the case of the heavy tonnage products. In some of the other products, the real test of the advances is deferred until consumers have used up some of their fourth quarter material.

Tonnage originating with the automotive industry is not yet very impressive, but steel manufacturers expect a good deal of business from that direction in the next 30 days. Demands from railroad car builders are not large, gaged by ordinary standards, but they are much heavier than they were a short time ago. The agricultural implement industry is still exceptionally active, thanks to the fact that foreign business has greatly improved. The best demand in tubular goods is in pipe for gas and oil lines. Building construction awards are not heavy at the moment, but some large bridge awards are looked for.

The pig iron market still lacks activity and, for that matter, real strength, since late comers seeking small tonnages have had to pay no more than the prices established on large-lot business a few weeks ago. The scrap market lately has given evidences that prices cannot be advanced merely because dealers want them to go higher. No discernible improvement is seen in the fuel situation.

Pig Iron.—The several inquiries before the market a few weeks ago, amounting to about 10,000 tons, have quietly slipped on to makers' books in the past week or 10 days, and the market again is back in the condition of having no worthwhile tonnages before it. Producers of foundry iron have been trying hard to restore the price of $17.50, Valley furnace, for No. 2 grade, but have found the current price of $17.25 so firmly in the minds of buyers that they have not succeeded. No open market demand for basic iron is noted, and only small

lots of other grades have been sold. The furnace of the Sharpsville Furnace Co. was started this morning after being banked for four months.

Prices per gross ton, f.o.b. Valley furnace:

Basic	$17.00
Bessemer	17.50
Gray forge	16.75
No. 2 foundry	17.25
No. 3 foundry	16.75
Malleable	17.50
Low phosphorus, copper free	27.00

Freight rate to the Pittsburgh or Cleveland district, $1.76.

Ferroalloys.—Some of the large consumers of ferromanganese have not yet placed formal contracts for their first half requirements, but this is due to the fact that most of them are carrying over a good stock into the new year. Some rush shipment orders are developing out of the Youngstown district, where there has been a substantial increase in steel works operations. Consumers of spiegeleisen and ferrosilicon are fairly well covered by contracts, and specifications for January shipments are liberal.

Semi-Finished Steel.—Makers of billets, slabs and sheet bars expect to make fairly large shipments in the coming month, in view of the fact that sheet and strip mills are well supplied with orders and are likely to increase rolling mill operations soon. Makers of wire rods appear to have rather generally covered regular customers before making the recent advance to $42, base Pittsburgh or Cleveland.

Bars, Plates and Shapes.—Makers have been getting good specifications against fourth quarter contracts for bars for delivery in January, and a reasonably full operation of mills is assured for that month. Makers of cold-finished steel bars have been successful in securing considerable first quarter business at the higher price named for that period and also have been getting good specifications against contracts which terminate on Dec. 31. Somewhat heavier demands for bolts and nuts are also having a favorable effect in hot-rolled bar specifications. Plate and shape fabrication is not so heavy now as it was a short time ago, but, evidently expecting higher prices, buyers are ordering out rather well the tonnage they have due them on fourth quarter contracts at prices about $1 a ton below current levels. Buyers are not resisting very strongly 1.80c., base Pittsburgh, on bars, plates and shapes on first quarter contracts, and a fair volume of such business is being entered.

Wire Products.—Makers have so much business in nails, in the form of specifications against protections and contracts for the quarter ending this month, that new orders calling for shipment by a specified date during the first half of January are being passed up in some cases. Nails now are moving and those to go out during the next 30 days or so will carry the old base price and the old extras, but on new business and on first quarter contracts all makers in this district are quoting the new base of $2.55 per keg, Pittsburgh, and the new extras. Jobbers have such ample stocks or coverage on nails that a real test of the new price and extras is still ahead.

Rails and Track Supplies.—Local makers shared in the distribution of spike and tie plate orders placed by the New York Central and the Baltimore & Ohio, which do not appear to have disturbed prices. Light-section rails are selling steadily in small lots at unchanged prices. The local standard-section rail mill is running well and has sufficient orders to keep it running full until well into the second quarter of the year.

Tubular Goods.—The principal activity is in large outside-diameter pipe for pipe lines, and even such business is rather poorly distributed among the makers. Several lines involving large tonnages are before the market, but are not moving very rapidly toward mill order books. Standard-weight pipe is in fairly good demand, but oil country goods, both welded and seamless, are still slow.

Cold-Finished Steel Bars and Shafting.—As detailed elsewhere, another card of extras has been issued on cold-finished steel bars and shafting, replacing one that was issued and dated Oct. 17, last. The principal changes are a modification of the quantity extras and revisions of the extras for polished and turned shafting and for cutting in length of less than 24 in. First quarter business is being booked in good volume, and specifications for unshipped tonnages on fourth quarter contracts are coming along well. The latter generally carry a price of 2.10c., base Pittsburgh, but on all new business 2.20c., base, is being firmly maintained.

Sheets.—Makers have been building up order books in good fashion this month. A report of the National Association of Sheet and Tin Plate Manufacturers shows that sales for the first half of the month were approximately 275,000 tons and that unfilled orders as of Dec. 15 had gone above 600,000 tons. This report covers only the independent companies reporting to that organization. The American Sheet & Tin Plate Co. and others have fared equally well, but the business generally carries prices so low that if there is a profit it will come chiefly through the reduction of costs that may be effected through enlarged mill operations. The first quarter prices, announced a few weeks ago, are still subject to concessions on orders for prompt shipment or for delivery at convenience of the mills. Railroad car builders and makers of agricultural implements are placing some good orders for sheets, and occasionally there is a good-sized release by motor car builders. Demand from the latter source is expected to increase considerably in January.

Tin Plate.—Specifications on contracts show some increase and mill operations tend to expand, but the larger quotas for March and April are needed for what is considered an economical operation, or more than 75 per cent of capacity. The market on short ternes is not very well defined, and quotations given elsewhere are still subject to substantial concessions.

Bolts, Nuts and Rivets.—Contracts for first quarter are coming along well, but specifications are light, though showing some increase over those of the past few weeks. Prices are firm on these products.

Fluorspar.—The large domestic producers are still holding to $16 at mines for gravel spar guaranteed to

The Iron Age Composite Prices

Finished Steel

Dec. 27, 1927, 2.314c. a Lb.

One week ago	2.314c.
One month ago	2.307c.
One year ago	2.453c.
10-year pre-war average	1.689c.

Based on steel bars, beams, tank plates, plain wire, open-hearth rails, black pipe and black sheets. These products constitute 86 per cent of the United States output of finished steel.

	High		Low	
1927	2.453c.,	Jan. 4;	2.293c.,	Oct. 25
1926	2.453c.,	Jan. 5;	2.403c.,	May 18
1925	2.560c.,	Jan. 6;	2.396c.,	Aug. 18
1924	2.789c.,	Jan. 15;	2.460c.,	Oct. 14
1923	2.824c.,	Apr. 24;	2.446c.,	Jan. 2

Pig Iron

Dec. 27, 1927, $17.54 a Gross Ton

One week ago	$17.54
One month ago	17.59
One year ago	19.88
10-year pre-war average	15.72

Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

	High		Low	
1927	$19.71,	Jan. 4;	$17.54,	Nov. 1
1926	21.54,	Jan. 5;	19.46,	July 13
1925	22.50,	Jan. 13;	18.96,	July 7
1924	22.88,	Feb. 26;	19.21,	Nov. 3
1923	30.86,	Mar. 20;	20.77,	Nov. 20

Mill Prices of Finished Iron and Steel Products

Iron and Steel Bars

Soft Steel — *Base Per Lb.*

F.o.b. Pittsburgh mills....1.80c.
F.o.b. Chicago....1.90c.
Del'd Philadelphia....2.12c.
Del'd New York....2.14c.
Del'd Cleveland....1.99c.
F.o.b. Cleveland....1.80c.
F.o.b. Buffalo....1.90c.
F.o.b. Birmingham....1.95c. to 2.05c.
C.i.f. Pacific ports....2.35c.
F.o.b. San Francisco mills....2.35c. to 2.40c.

Billet Steel Reinforcing

F.o.b. Pittsburgh mills....1.80c. to 1.90c.
F.o.b. Birmingham....2.00c. to 2.10c.

Rail Steel

F.o.b. mills east of Chicago district.1.65c. to 1.70c.
F.o.b. Chicago Heights mill....1.80c.

Iron

Common iron, f.o.b. Chicago....1.90c.
Refined iron, f.o.b. P'gh mills....2.75c.
Common iron, del'd Philadelphia....2.12c.
Common iron, del'd New York....2.14c.

Tank Plates

Base Per Lb.

F.o.b. Pittsburgh mills....1.80c.
F.o.b. Chicago....1.90c.
F.o.b. Birmingham....1.95c. to 2.05c.
Del'd Cleveland....1.99c.
Del'd Philadelphia....2.05c.
F.o.b. Coatesville....1.95c.
F.o.b. Sparrows Point....1.95c.
F.o.b. Buffalo....1.90c.
Del'd New York....2.12½c.
C.i.f. Pacific ports....2.30c.

Structural Shapes

Base Per Lb.

F.o.b. Pittsburgh mills....1.80c.
F.o.b. Chicago....1.90c.
F.o.b. Birmingham....1.95c. to 2.05c.
F.o.b. Buffalo....1.90c.
F.o.b. Bethlehem....1.95c.
Del'd Cleveland....1.99c.
Del'd Philadelphia....2.08c.
Del'd New York....2.09½c.
C.i.f. Pacific ports....2.35c.

Hot-Rolled Flats (Hoops, Bands and Strips)

Base Per Lb.

All gages, 2 in. and narrower, P'gh, 2.10c. to 2.20c.
All gages, wider than 2 in., to 6 in., P'gh, 2.00c. to 2.10c.
*All gages, 6 in. and wider, P'gh..1.80c. to 1.90c.
All gages, narrower than 6 in., Chicago..2.40c.
All gages, 6 in. and wider, Chicago, 2.20c. to 2.40c.

*Mills follow plate or sheet prices according to gage on wider than 14 in.

Cold-Finished Steel

Base Per Lb.

Bars, f.o.b. Pittsburgh mills....2.10c. to 2.20c.
Bars, f.o.b. Chicago....2.20c.
Bars, Cleveland....2.25c.
Shafting, ground, f.o.b. mill....*2.35c. to 2.80c.
Strips, under 12 in., 1 up to 3 tons, P'gh, 3.00c. to 3.15c.
Strips, under 12 in., 1 up to 3 tons, Cleveland....3.00c. to 3.15c.
Strips, under 12 in., 1 up to 3 tons, del'd Chicago....3.20c. to 3.45c.
Strips, under 12 in., 1 up to 3 tons, Worcester....3.25c. to 3.40c.

*According to size.

Wire Products

(To jobbers in car lots, f.o.b. Pittsburgh and Cleveland) *Base Per Keg*

Wire nails....$2.50 to $2.55
Galvanized nails....4.50 to 4.55
Galvanized staples....3.20 to 3.25
Polished staples....2.95 to 3.00
Cement coated nails....2.50 to 2.55

Base Per 100 Lb.

Bright plain wire, No. 9 gage....$2.40
Annealed fence wire....2.55
Spring wire....3.40
Galv'd wire, No. 9....3.00
Barbed wire, galv'd....$3.20 to 3.25
Barbed wire, painted....2.95 to 3.00

Chicago district mill and delivered Chicago prices are $1 per ton above the foregoing. Birmingham mill prices $3 a ton higher; Worcester, Mass., (wire) mill $3 a ton higher on production of that plant; Duluth, Minn., mill $2 a ton higher; Anderson, Ind., $1 higher.

Woven Wire Fence

Base to Retailers Per Net Ton

F.o.b. Pittsburgh....$65.00
F.o.b. Cleveland....65.00
F.o.b. Anderson, Ind....66.00
F.o.b. Chicago district mills....67.00
F.o.b. Duluth....68.00
F.o.b. Birmingham....68.00

Sheets

Blue Annealed

Base Per Lb.

Nos. 9 and 10, f.o.b. Pittsburgh...2.10c. to 2.15c.
Nos. 9 and 10, f.o.b. Chicago dist. mill, 2.15c. to 2.30c.
Nos. 9 and 10 del'd Cleveland...2.19c. to 2.29c.
Nos. 9 and 10, del'd Philadelphia.2.42c. to 2.47c.
Nos. 9 and 10, f.o.b. Birmingham.2.25c. to 2.30c.

Box Annealed, One Pass Cold Rolled

No. 24, f.o.b. Pittsburgh....2.80c. to 2.90c.
No 24, f.o.b. Chicago dist. mill...2.90c. to 3.00c.
No. 24, del'd Cleveland....2.94c. to 3.09c.
No. 24, del'd Philadelphia....3.12c. to 3.22c.
No. 24, f.o.b. Birmingham....3.05c.

Metal Furniture Sheets

No. 24, f.o.b. Pittsburgh, A grade.3.95c. to 4.05c.
No. 24, f.o.b. Pittsburgh, B grade.3.75c. to 3.85c.

Galvanized

No. 24, f.o.b. Pittsburgh....3.65c. to 3.75c.
No. 24, f.o.b. Chicago dist. mill...3.70c. to 3.85c.
No. 24, del'd Cleveland....3.74c. to 3.84c.
No. 24, del'd Philadelphia....3.97c. to 4.07c.
No. 24, f.o.b. Birmingham....3.90c.

Tin Mill Black Plate

No. 28, f.o.b. Pittsburgh....2.90c. to 3.00c.
No. 28, f.o.b. Chicago dist. mill...3.00c. to 3.10c.

Automobile Body Sheets

No 20, f.o.b. Pittsburgh....4.00c.

Long Ternes

No. 24, 8-lb. coating, f.o.b. mill primes...4.10c.

Tin Plate

Per Base Box

Standard cokes, f.o.b. P'gh district mills...$5.25
Standard cokes, f.o.b. Gary and Elwood, Ind. 5.35

Terne Plate

(*F.o.b. Morgantown or Pittsburgh*)

(Per package, 20 x 28 in.)

8-lb. coating I.C.$11.40 | 25-lb. coating I.C.$17.30
15-lb. coating I.C. 14.45 | 30-lb. coating I.C. 18.75
20-lb. coating I.C. 15.80 | 40-lb. coating I.C. 20.85

Alloy Steel Bars

(F.o.b. Pittsburgh, Chicago or Ohio Mill)

S. A. E. Series Numbers		*Base Per 100 Lb.*
2100*	(1½% Nickel, 0.10% to 0.20% Carbon)	$2.90 to $3.00
2300	(3½% Nickel)	4.00 to 4.10
2500	(5% Nickel)	5.00 to 5.25
3100	(Nickel Chromium)	3.00 to 3.10
3200	(Nickel Chromium)	4.75 to 5.00
3300	(Nickel Chromium)	6.75 to 7.00
3400	(Nickel Chromium)	6.00 to 6.25
5100	(Chromium Steel)	3.00 to 3.10
5200*	(Chromium Steel)	7.00 to 7.50
6100	(Chrom. Vanadium bars)	4.00 to 4.15
6100	(Chrom. Vanad. spring steel)	3.50 to 3.75
9250	(Silicon Manganese spring steel)	3.00 to 3.15
	Carbon Vanadium (0.45% to 0.55% Carbon, 0.15% Vanad.)	4.10 to 4.20
	Nickel Chrome Vanadium (0.60 Nickel, 0.50 Chrom., 0.15 Vanad.)	4.05 to 4.20
	Chromium Molybdenum bars (0.80—1.10 Chrom., 0.25—0.40 Molyb.)	4.00 to 4.25
	Chromium Molybdenum bars (0.50—0.70 Chrom., 0.15—0.25 Molyb.)	3.05 to 3.10
	Chromium Molybdenum spring steel (1—1.25 Chrom., 0.30—0.50 Molybdenum)	4.50 to 4.75

Above prices are for hot-rolled steel bars, forging quality. The ordinary differential for cold-drawn bars is 1c. per lb. higher. For billets 4 x 4 to 10 x 10 in. the price for a gross ton is the net price for bars of the same analysis. For billets under 4 x 4 in. down to and including 2½ in. squares, the price is $5 a gross ton above the 4 x 4 billet price.

*Not S. A. E. specification, but numbered by manufacturers to conform to S. A. E. system.

Rails

Per Gross Ton

Standard, f.o.b. mill....$43.00
Light (from billets), f.o.b. mill....36.00
Light (from rail steel), f.o.b. mill....34.00
Light (from billets), f.o.b. Ch'go mill....36.00

Track Equipment

Base Per 100 Lb.

Spikes, ⅝ in. and larger....$2.80
Spikes, ½ in. and smaller....$2.75 to 2.80
Spikes, boat and barge....3.10
Tie plates, steel....2.25
Angle, bars....2.75
Track bolts, to steam railroads....3.80 to 4.00
Track bolts, to jobbers, all sizes, per 100 count, 70 per cent off list

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

Butt Weld

Steel Inches	Black	Galv.	Iron Inches	Black	Galv.
⅛	45	19½	¼ to ⅜	+11	+39
¼ to ⅜	51	25½	½	22	2
½	56	42½	¾	28	11
¾	60	48½	1 to 1½	30	13
1 to 3	62	50½			

Lap Weld

2	55	43½	2	23	7
2½ to 6	59	47½	2½	26	11
7 and 8	56	43½	3 to 6	28	13
9 and 10	45	32½	7 to 12	26	11
11 and 12	53	40½			

Butt Weld, extra strong, plain ends

⅛	41	24½	¼ to ⅜	+19	+54
¼ to ⅜	47	30½	½	21	17
½	53	42½	¾	28	12
¾	58	47½	1 to 1½	30	14
1 to 1½	60	49½			
2 to 3	61	50½			

Lap Weld, extra strong, plain ends

2	53	42½	2	23	9
2½ to 4	57	46½	2½ to 4	29	15
4½ to 6	56	45½	4½ to 6	28	14
7 to 8	52	39½	7 to 8	21	15
9 and 10	45	32½	9 to 12	16	2
11 and 12	44	31½			

To the large jobbing trade the above discounts on steel pipe are increased on black by one point, with supplementary discount of 5 and 5%, and on galvanized by 1½ points, with supplementary discount of 5%. On iron pipe, both black and galvanized, the above discounts are increased to large jobbers by one point with supplementary discounts of 5 and 2½%.

Note.—Chicago district mills have a base two-points less than the above discounts. Chicago delivered base is 2½ points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

Boiler Tubes

Base Discounts, f.o.b. Pittsburgh

Lap Welded Steel		*Charcoal Iron*	
2 to 2¼ in.	27	1½ in.	+18
2½ to 2¾ in.	37	1¾ to 1⅞ in.	+ 8
3 in.	40	2 to 2¼ in.	— 2
3¼ to 3¾ in.	42½	2½ to 3 in.	— 7
4 to 13 in.	46	3¼ to 4½ in.	— 9

Beyond the above discounts, 7 fives extra are given on lap welded steel tubes and 2 tens to 2 tens and 1 five on charcoal iron tubes.

Standard Commercial Seamless Boiler Tubes

Cold Drawn

1 in.	60	3 in.	45
1¼ to 1½ in.	52	3¼ to 3½ in.	47
1¾ in.	36	4 in.	50
2 to 2¼ in.	31	4½, 5 and 6 in.	45
2½ to 2¾	39		

Hot Rolled

2 and 2¼ in.	37	3¼ and 3½ in.	53
2½ and 2¾ in.	45	4 in.	56
3 in.	51	4½, 5 and 6 in.	51

Less carloads, 4 points less. Add $8 per net ton for more than four gages heavier than standard. No extra for lengths up to and including 24 ft. Sizes smaller than 1 in. and lighter than standard gage to be held at mechanical tubes list and discount. Intermediate sizes and gages not listed take price of next larger outside diameter and heavier gage.

Seamless Mechanical Tubing

Per Cent Off List

Carbon, 0.10% to 0.30%, base....55
Carbon, 0.30% to 0.40%, base....50

Plus differentials for lengths over 18 ft. and for commercial exact lengths. Warehouse discounts on small lots are less than the above.

average at least 85 per cent in calcium fluoride and not more than 5 per cent in silica and have quoted that price on two good-sized inquiries emanating from the Youngstown district. The business is still pending. Some producers are quoting 50c. a ton less. Little foreign spar has been sold lately in this part of the country, as it runs too high in silica to satisfy steel makers. Sales are reported in the Philadelphia district at $16 per net ton, port duty paid.

Hot-Rolled Flats.—There continues to be plenty of business, but it is being entered at highly competitive prices, particularly on stock 6 in. and wider.

Cold-Rolled Strips.—The market is steadier, but so much business has been taken at prices that are unsatisfactory to makers that the most that can be said is that prices have stopped declining.

Old Material.—Efforts to push the price of heavy melting steel above $15.50 appear to have failed, as at least one consumer in this district has been able to secure a good-sized tonnage at that price. The market has reached a stage where it is not a question of getting a price, but of where to sell, since all of the important melters of this grade now have a supply. Blast furnace scrap is stronger, but an oversupply of machine shop turnings has made it impossible to sell them at more than $11.

Prices per gross ton delivered consumers' yards in Pittsburgh and points taking the Pittsburgh district freight rate:

Basic Open-Hearth Furnace Grades:	
Heavy melting steel	$15.00 to $15.50
Scrap rails	14.50 to 15.00
Compressed sheet steel	14.00 to 14.50
Bundled sheets, sides and ends	13.00 to 13.50
Cast iron carwheels	14.00 to 14.50
Sheet bar crops, ordinary	15.00 to 15.50
Heavy breakable cast	13.00 to 13.50
No. 2 railroad wrought	15.00 to 15.50
Heavy steel axle turnings	13.00 to 13.50
Machine shop turnings	11.00
Acid Open-Hearth Furnace Grades:	
Railroad knuckles and couplers	17.00 to 17.25
Railroad coil and leaf springs	17.00 to 17.25
Rolled steel wheels	16.50 to 17.00
Low phosphorus billet and bloom ends	18.50 to 19.00
Low phosphorus, mill plate	17.50 to 18.00
Low phosphorus, light grade	16.50 to 17.00
Low phosphorus sheet bar crops	17.50 to 18.00
Heavy steel axle turnings	13.00 to 13.50
Electric Furnace Grades:	
Low phosphorus punchings	16.50 to 17.00
Heavy steel axle turnings	13.00 to 13.50
Blast Furnace Grades:	
Short shoveling steel turnings	11.50 to 12.00
Short mixed borings and turnings	11.50 to 12.00
Cast iron borings	11.50 to 12.00
No. 2 busheling	10.00 to 10.50
Rolling Mill Grades:	
Steel car axles	18.00 to 19.00
No. 1 railroad wrought	11.00 to 11.50
Sheet bar crops	17.00 to 17.50
Cupola Grades:	
No. 1 cast	14.50 to 15.00
Rails 3 ft. and under	15.00 to 15.50
Malleable Grades:	
Railroad	15.00 to 15.50
Industrial	14.50 to 15.00
Agricultural	14.00 to 14.50

Warehouse Prices, f.o.b. Pittsburgh

	Base per Lb.
Plates	3.00c.
Structural shapes	3.00c.
Soft steel bars and small shapes	2.90c.
Reinforcing steel bars	2.75c.
Cold-finished and screw stock—	
Rounds and hexagons	3.60c.
Squares and flats	4.10c.
Bands	3.60c.
Hoops	4.00c. to 4.50c.
Black sheets (No. 24 gage), 25 or more bundles	3.55c.
Galvanized sheets (No. 24 gage), 25 or more bundles	4.40c.
Blue annealed sheets (No. 10 gage), 25 or more sheets	3.10c.
Galvanized corrugated sheets (No. 28 gage), per square	$4.39
Spikes, large	3.30c. to 3.40c.
Small	3.80c. to 5.25c.
Boat	3.80c.
Track bolts, all sizes, per 100 count,	62½ per cent off list
Machine bolts, per 100 count.	62½ per cent off list
Carriage bolts, per 100 count.	62½ per cent off list
Nuts, all styles, per 100 count,	62½ per cent off list
Large rivets, base per 100 lb.	$3.50
Wire, black soft annealed, base per 100 lb.	2.90
Wire, galvanized soft, base per 100 lb.	2.90
Common wire nails, per keg	$2.80 to 2.90
Cement coated nails, per keg	2.85 to 2.95

Coke and Coal.—Little change is observed in general conditions in the coal and coke market. Seemingly a curtailment of production has not brought supply and demand together, and prices still are favorable to buyers, with standard beehive furnace coke readily obtainable for spot shipment at $2.75 per net ton at ovens and spot foundry coke ranging from $3.75 to $4.25. Slack grade of coal is not quite so plentiful as it has been, but with all grades of coal producers are more anxious to sell than consumers are to buy.

Cold-Finished Bar Quantity Extras Modified

The Jones & Laughlin Steel Corporation has issued, under date of Dec. 24, a card of extras on cold-finished steel bars and shafting that somewhat modifies the quantity differentials established in a card dated Oct. 17, 1927, which was adopted and issued by a majority of the makers. In the latter card, lots of from 2000 lb. to 5999 lb., called for a quantity extra of 20c. per 100 lb., while in the Jones & Laughlin card that charge is made for lots of 2000 to 3999 lb. In other words, quantity extras will not apply unless the order for one size is less than 2 tons, while in the Oct. 17 card it was necessary for the buyer to place at least 3 tons of a size to escape an extra charge for quantity.

In setting 4000 lb. as the minimum quantity on which a quantity extra will not be charged, the Jones & Laughlin corporation is merely making the cold-finished steel bar card conform in respect to quantity charges to the card on hot-rolled bars that it recently issued. It is expected that other producers will modify their cards to conform to this new one, which also establishes new size brackets and new extras for polished and ground shafting. The new and old extras for polished and ground shafting, per 100 lb., follow:

Dec. 15, 1927		Oct. 17, 1927	
1¼ to 1⅞ in.	50c.	1⅛ to 1⅞ in.	25c
1⅞ to 1⅝ in.	35c.	1½ to 2 in.	15c.
1⅛ to 2 in.	15c.	2⅛ to 2⅞ in.	10c.
2⅛ to 2⅞ in.	10c.		

Extras for cutting in lengths of 3 in. to, but not including, 24 in., also are changed in the new card, being substantially advanced. The lengths revised and the new and old extras, per 100 lb., follow:

	Rounds, Squares and Hexagons		Flats	
	New	Old	New	Old
3 to 5⅛ in.	$2.50	$1.50	$5.00	$3.00
6 to 11½ in.	1.25	0.75	2.50	1.50
12 to 23½ in.	0.50	0.45	1.00	0.75

Large Output of Coal Maintained

Production of bituminous coal in the week ended Dec. 17 is reported by the United States Bureau of Mines at 9,806,000 net tons, a substantial gain over each of the two preceding weeks. It brought the total for the year, to that date, above 500,000,000 tons, and thus exceeded the figures for 1925 and 1924, the latter by nearly 25 per cent. The total, 502,026,000 tons, is nearly 10 per cent behind 1926 and about 8 per cent behind 1923.

Anthracite production has run about 1,387,000 tons a week for three weeks. The total to Dec. 17 is given as 77,916,000 tons, or 3 per cent under last year's 82,368,000 tons to the same date.

Loadings of revenue freight for the week ended Dec. 10 totaled 877,600 cars, according to reports filed by the railroads with the car service division of the American Railway Association. This was a decrease of 40,637 cars below the preceding week, when 918,237 cars were loaded. It also represented a decrease of 114,855 cars compared with the same week last year, and of 131,096 cars compared with the corresponding week in 1925. Total loadings for 1927 up to Dec. 10 were 50,077,882 cars, as against 51,393,662 in the same period in 1926 and 49,553,353 in the corresponding period in 1925.

Semi-Finished Steel, Raw Materials, Bolts and Rivets

Mill Prices of Semi-Finished Steel

F.o.b. Pittsburgh or Youngstown

Billets and Blooms

	Per Gross Ton
Rerolling, 4-in. and over	$33.00
Rerolling, under 4-in. to and including 1¾ in.	$33.50 to 34.00
Forging, ordinary	38.00 to 39.00
Forging, guaranteed	43.00 to 44.00

Sheet Bars

	Per Gross Ton
Open-hearth or Bessemer	$34.00

Slabs

	Per Gross Ton
8 in. x 2 in. and larger	$33.00
Smaller than 8 in. x 2 in.	34.00

Skelp

	Per Lb.
Grooved	1.80c.
Sheared	1.80c.
Universal	1.80c.

Wire Rods

	Per Gross Ton
*Common soft, base	$40.00 to $42.00
Screw stock	$5.00 per ton over base
Carbon 0.20% to 0.40%	3.00 per ton over base
Carbon 0.41% to 0.55%	5.00 per ton over base
Carbon 0.56% to 0.75%	7.50 per ton over base
Carbon over 0.75%	10.00 per ton over base
Acid	15.00 per ton over base

*Chicago mill base is $42 to $43. Cleveland mill base, $40.

Prices of Raw Material

Ores

Lake Superior Ores, Delivered Lower Lake Ports

	Per Gross Ton
Old range Bessemer, 51.50% iron	$4.55
Old range non-Bessemer, 51.50% iron	4.40
Mesabi Bessemer, 51.50% iron	4.40
Mesabi non-Bessemer, 51.50% iron	4.25
High phosphorus, 51.50% iron	4.15

Foreign Ore, c.i.f. Philadelphia or Baltimore

	Per Unit
Iron ore, low phos., copper free, 55 to 58% iron in dry Spanish or Algeria	10.00c.
Iron ore, Swedish, average 66% iron,	9.25c. to 9.50c.
Manganese ore, washed, 52% manganese, from the Caucasus	39c.
Manganese ore, Brazilian, African or Indian, basis 50%	38c. to 39c.
Tungsten ore, high grade, per unit, in 60% concentrates	$10.25 to $10.75
	Per Gross Ton
Chrome ore, 45 to 50% Cr_2O_3, crude, c.i.f. Atlantic seaboard	$22.00 to $24.00
	Per Lb.
Molybdenum ore, 85% concentrates of MoS_2, delivered	50c. to 55c.

Coke

	Per Net Ton
Furnace, f.o.b. Connellsville prompt	$2.75
Foundry, f.o.b. Connellsville prompt	$3.75 to 4.50
Foundry, by-product, Ch'go ovens	9.00
Foundry, by-product, New England, del'd	11.50
Foundry, by-product, Newark or Jersey City, delivered	9.45 to 9.85
Foundry, Birmingham	5.00
Foundry, by-product, St. Louis	9.75

Coal

	Per Net Ton
Mine run steam coal, f.o.b. W. Pa. mines	$1.40 to $1.90
Mine run coking coal, f.o.b. W. Pa. mines	1.50 to 1.75
Mine run gas coal, f.o.b. Pa. mines	1.75 to 1.90
Steam slack, f.o.b. W. Pa. mines	0.80 to 1.00
Gas slack, f.o.b. W. Pa. mines	1.00 to 1.25

Ferromanganese

	Per Gross Ton
Domestic, 80%, furnace or seab'd	$100.00
Foreign, 80%, Atlantic or Gulf port, duty paid	100.00

Spiegeleisen

	Per Gross Ton Furnace
Domestic, 19 to 21%	$30.00
Domestic, 16 to 19%	29.00

Electric Ferrosilicon

	Per Gross Ton Delivered
50%	$83.50
75%	135.00

	Per Gross Ton Furnace		*Per Gross Ton Furnace*
10%	$35.00	12%	$39.00
11%	37.00	14 to 16%	45.00

Bessemer Ferrosilicon

F.o.b. Jackson County, Ohio, Furnace

	Per Gross Ton		*Per Gross Ton*
10%	$30.00	12%	$34.00
11%	32.00		

Silvery Iron

F.o.b. Jackson County, Ohio, Furnace

	Per Gross Ton		*Per Gross Ton*
6%	$23.00	10%	$28.00
7%	24.00	11%	30.00
8%	25.00	12%	32.00
9%	26.00		

Other Ferroalloys

Ferrotungsten, per lb. contained metal, del'd	92c. to 95c.
Ferrochromium, 4 to 6% carbon and up, 65 to 70% Cr., per lb. contained Cr. delivered, in carloads	11.00c.
Ferrovanadium, per lb. contained vanadium, f.o.b. furnace	$3.15 to $3.65
Ferrocarbontitanium, 15 to 18%, per net ton, f.o.b. furnace, in carloads	$200.00
Ferrophosphorus, electric or blast furnace material, in carloads, 18%, Rockdale, Tenn., base, per net ton	$91.00
Ferrophosphorus, electric, 24%, f.o.b. Anniston, Ala., per net ton	$122.50

Fluxes and Refractories

Fluorspar

	Per Net Ton
Domestic, 85% and over calcium fluoride, not over 5% silica, gravel, f.o.b. Illinois and Kentucky mines	$15.50 to $16.00
No. 2 lump, Illinois and Kentucky mines	$20.00
Foreign, 85% calcium fluoride, not over 5% silica, c.i.f. Atlantic port, duty paid	$16.00
Domestic, No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2½% silica, f.o.b. Illinois and Kentucky mines	$32.50

Fire Clay

	Per 1000 f.o.b. Works	
	First Quality	Second Quality
Pennsylvania	$43.00 to $46.00	$35.00 to $38.00
Maryland	43.00 to 46.00	35.00 to 38.00
New Jersey	50.00 to 65.00	—
Ohio	43.00 to 46.00	35.00 to 38.00
Kentucky	43.00 to 46.00	35.00 to 38.00
Missouri	43.00 to 46.00	35.00 to 38.00
Illinois	43.00 to 46.00	35.00 to 38.00
Ground fire clay, per ton	7.00	

Silica Brick

	Per 1000 f.o.b. Works
Pennsylvania	$43.00
Chicago	52.00
Birmingham	50.00
Silica clay, per ton	$8.50 to 10.00

Magnesite Brick

	Per Net Ton
Standard sizes, f.o.b. Baltimore and Chester, Pa.	$65.00
Grain magnesite, f.o.b. Baltimore and Chester, Pa.	40.00

Chrome Brick

	Per Net Ton
Standard size	$45.00

Mill Prices of Bolts, Nuts, Rivets and Set Screws

Bolts and Nuts

Per 100 Pieces

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

	Per Cent Off List
†Machine bolts	70
†Carriage bolts	70
Lag bolts	70
Plow bolts, Nos. 1, 2, 3 and 7 heads	70
Hot-pressed nuts, blank or tapped, square	70
Hot-pressed nuts, blank or tapped, hexagon	70
C.p.c. and t. square or hex. nuts, blank or tapped	70
Washers*	6.75c. to 6.50c. per lb. off list

*F.o.b. Chicago, New York and Pittsburgh.
†Bolts with rolled threads up to and including ⅝ in. x 6 in. take 10 per cent lower list prices.

Bolts and Nuts

	Per Cent Off List
Semi-finished hexagon nuts	70
Semi-finished hexagon castellated nuts, S.A.E.	70
Stove bolts in packages	80, 10 and 5
Stove bolts in bulk	80, 10, 5 and 2½
Tire bolts	60, 5 and 5

Discount of 70 per cent off on bolts and nuts applied on carload business. For less than carload orders discounts of 55 to 60 per cent apply.

Large Rivets

(½-In. and Larger)

	Base per 100 Lb.
F.o.b. Pittsburgh or Cleveland	$2.75
F.o.b. Chicago	2.85

Small Rivets

(7/16-In. and Smaller)

	Per Cent Off List
F.o.b. Pittsburgh	70, 10 and 5
F.o.b. Cleveland	70, 10 and 5 to 70 and 10
F.o.b. Chicago	70, 10, 10 and 5 to 70 and 10

Cap and Set Screws

(Freight allowed up to but not exceeding 50c. per 100 lb. on lots of 200 lb. or more)

	Per Cent Off List
Milled cap screws	80, 10 and 10
Milled standard set screws, case hardened,	80 and 10
Milled headless set screws, cut thread	80
Upset hex. head cap screws, U.S.S. thread,	85 and 5
Upset hex. cap screws, S.A.E. thread	85 and 5
Upset set screws	80, 10 and 10
Milled studs	70 and 5

Chicago

Large Freight Car Orders Placed—Illinois Central Buys 50,000 Tons of Rails

CHICAGO, Dec. 27.—Large orders and inquiries for railroad equipment and fresh rail buying are of outstanding interest in the local steel market. At the same time, releases against 1928 rail contracts have permitted a further increase in mill operations. Purchases of freight cars by three railroads total 6800, while the St. Louis-San Francisco has definitely come into the market for 4000 miscellaneous cars and it is probable that the Pacific Fruit Express will inquire for 2000 refrigerator cars. The Illinois Central has divided orders for 50,000 tons of rails among the Illinois Steel Co., the Inland Steel Co. and the Tennessee Coal, Iron & Railroad Co.

This railroad business is particularly opportune because it will give the mills backlogs to fill in gaps in their rolling schedules. Deliveries of plates, shapes and bars in small lots have already extended somewhat, and further equipment buying may make it difficult for buyers to operate with "zero" inventories. An order for 2000 tons of tankage material has come from western Texas.

The Inland Steel Co. continues to operate three blast furnaces, but its fourth stack is being warmed up and will be ready to go into blast if the market warrants it. Operations among other steel works stacks are unchanged, but steel makers are making heavier drafts on their stocks of cold iron. As a result of the week's increase in rail output, ingot production has reached 74 per cent of capacity.

Pig Iron.—The market is quiet except for contracting for the first quarter and the first half. There is every indication that production in the late months of the year has been in excess of the local melt, and while no definite statement is forthcoming from producers, it is not unlikely that one if not two merchant stacks will be blown out before the end of January. Operators of the Mayville stack are considering taking it out of service about the middle of January. A Milwaukee melter is in the market for 1500 tons of malleable and foundry iron and 65 tons of 15 per cent silvery. Sales of charcoal iron are not numerous.

Prices per gross ton at Chicago:

Northern No. 2 foundry, sil. 1.75 to 2.25	$18.50
N'th'n No. 1 fdy., sil. 2.25 to 2.75	19.00
Malleable, not over 2.25 sil.	18.50
High phosphorus	18.50
Lake Superior charcoal, averaging sil. 1.50	27.04
Southern No. 2 fdy. (all rail)	22.01
Southern No. 2 (barge and rail)	20.18
Low phos., sil. 1 to 2 per cent, copper free	$28.50 to 29.00
Silvery, sil. 8 per cent	29.79
Bessemer ferrosilicon, 14 to 15 per cent	46.79

Prices are delivered consumers' yards except on Northern foundry, high phosphorus and malleable which are f.o.b. local furnace, not including an average switching charge of 61c. per gross ton.

Ferroalloys.—This market is quiet, following active forward contracting. Producers of spiegeleisen are making a stand for higher prices, and sellers in this district have placed several carlots of the 19 to 21 per cent grade at $32, Hazard, Pa., which is an advance of $2 a ton over prices a week ago.

Prices delivered Chicago: 80 per cent ferromanganese, $107.56; 50 per cent ferrosilicon, $83.50 to $87.50; spiegeleisen, 18 to 22 per cent, $36.76 to $37.76.

Cast Iron Pipe.—Milwaukee closes Jan. 9 on 1000 tons of 6-in., 1500 tons of 8-in., 1500 tons of 12-in. and 1000 tons of 16-in. Class C water pipe, and 300 tons special castings. Cincinnati will buy 1500 tons of 3-in. to 12-in. pipe and 100 tons of special castings. Jackson, Mich., will open bids Jan. 10 on 110 tons of 6-in. Class C pipe. The United States Cast Iron Pipe & Foundry Co. is said to be low bidder on 250 tons of 2-in. to 8-in. Class B pipe, and Lancaster, Ohio, has awarded 200 tons to an unnamed bidder. Buying is dull except on the part of public utilities that are still anxious to place some tonnage for spring delivery. The trade believes that prices are too unstable to attract winter buyers, and it is evident at this time that practically no interest is being shown in future requirements.

Prices per net ton, delivered Chicago: Water pipe, 6-in. and over, $36.20 to $38.20; 4-in., $40.20 to $42.20; Class A and gas pipe, $4 extra.

Plates.—Of outstanding interest in the plate market is the fact that three major railroads have purchased 6800 freight cars, requiring not less than 80,000 tons of plates, shapes and bars. It is probable that more than 4000 of these cars will be built in Western shops. The purchases were as follows: Santa Fe, 3650; Louisville & Nashville, 2150, and the Chicago & North Western, 1000 cars. Several large inquiries for cars are in the making. One of these, the largest yet to come, will be out for figures early in January, and the railroad in question is anxious to have shop work begin before the end of that month. Miscellaneous plate business is of good size, but individual orders, as a rule, are small, affording mills little opportunity to arrange satisfactory rolling schedules. The release of steel for cars will fill in the gaps and provide a backlog tonnage. Mill prices, at 1.90c. per lb., base Chicago, for large tonnages and 2c. for less than 100 tons, are not showing great strength.

Mill prices on plates per lb.: 1.90c., base, Chicago.

Structural Material.—Outstanding among awards this week is 4600 tons for the Jones Building, Houston, Tex., which was taken by the Petroleum Iron Works. Among active projects is the Lincoln High School, Milwaukee, 1500 tons, and a viaduct at Wolcott, Colo., for the Denver & Salt Lake Railway. It develops that further delays are being experienced in the preparation of final plans for the Chicago *Daily News* building and that the contract for the structural steel may not be placed before the first of the year. Chicago shops will enter the new year with fair backlogs, larger in fact than was indicated when the winter season set in. Contrary to experience a year ago, specifications from fabricating shops are growing heavier as the year comes to a close.

Mill prices on plain material per lb.: 1.90c., base, Chicago.

Bars.—The inventory period in the farm implement trade is out of the way, and production is again hitting a stride that is close to capacity. Specifications for soft steel bars from that source are measurably larger and call for immediate delivery, reflecting confidence in a sustained demand for farm machinery in the winter months and heavy deliveries in the spring. Shipments to automobile manufacturers and forgers are increasing but slowly at present, but January schedules give promise of a sharp upturn. Mill backlogs continue to expand and those users who have been depending on mills for prompt shipments of small orders are finding deliveries less satisfactory except when their requirements match with rolling schedules. The iron bar market is quiet, with shipments light. In alloy steel bars first quarter contracts are well covered and specifications are only moderately larger than a week ago. Forward contracting in rail steel bars now gives promise of exceeding that for any three-month period in several years. Spot buying, however, has dropped sharply, and specifications are unusually light. Barn equipment manufacturers are in the midst of a dull season, and the bed trade shows no improvement. The spurt of last week in orders for fence posts has subsided. Both Chicago Heights mills continue to operate double turn, and, with shipments measurably lighter, stocks are increasing at a rapid pace. One mill in this district will close down during the final week in the year for repairs. Quotations on hard steel bars are steady at 1.80c., Chicago Heights mill.

Mill prices per lb.: Soft steel bars, 1.90c., base, Chicago; common bar iron, 1.90c., base, Chicago; rail steel bars, 1.80c., base, Chicago Heights mill.

Reinforcing Bars.—Fresh inquiry totals over 2000 tons, made up of good-sized individual lots. A warehouse calls for 600 tons, and a pumping plant, 500 tons, while an apartment building will take 520 tons. The

Chicago public school program is forging ahead, with inquiries for two new structures out this week. Awards have been adversely affected by the holiday season. Shipments from warehouses are falling, and bending operations do not average above 50 per cent of capacity. Prices are stationary, in spite of the attempt by some dealers to pull them up to a higher level. Recent awards and new inquiries are shown on page 1805.

Sheets.—This market is quiet, and the Milwaukee mills will be down until after the New Year holiday. Specifications are light and erratic, giving less promise than a week ago that operations could be put on a more satisfactory basis. Forward contracting is about at an end, and asking prices are 3.85c., base, Indiana Harbor, for galvanized sheets, 3c. for black and 2.20c. to 2.30c. for blue annealed. Orders to mills from warehouses are small, as is usually the case at this time of the year.

Base prices per lb., delivered from mill in Chicago: No. 24 black, 2.95c. to 3.05c.; No. 24 galvanized, 3.75c. to 3.90c.; No. 10 blue annealed, 2.20c. to 2.35c. Delivered prices at other Western points are equal to the freight from Gary plus the mill prices, which are 5c. per 100 lb. lower than the Chicago delivered prices.

Wire Products.—December comes to a close with practically no change in the rate of shipments either to the jobbing trade or to manufacturing consumers. Mill output is close to 60 per cent of capacity, and stocks, which are well rounded but not excessive, are being turned. It is a common belief that stocks in the hands of jobbers are relatively heavier. The margin, however, is small and reflects the intent of the warehouses to meet more promptly the demands of the retail trade. Prices are stronger on nails, though buying at the new schedule has not assumed large proportions. Producers report that orders taken for woven wire fencing for spring delivery are heavier than in either of the two previous years. Mill prices of wire and wire products are given on page 1809.

Rails and Track Supplies.—Fresh inquiry for standard-section rails totals 20,000 tons, leaving about 80,000 tons that Western producers still expect to come up for figures. Actual orders are small. Several Mid-Western railroads have placed 10,000 tons of track fastenings, and inquiry has reached a total of 35,000 tons. Rail production was held steady up to the end of the holiday period, Tuesday of this week, when it was stepped up rather sharply. No change in the rate of output in track accessories is noted, but schedules now being arranged indicate heavier shipments by the middle of January. Light rails are moving slowly but, at that, better than a year ago in the final month of the year.

Prices f.o.b. mill, per gross ton: Standard-section open-hearth and Bessemer rails, $43; light rails, rolled from billets, $36. *Per Lb.:* Standard railroad spikes, 2.80c.; track bolts with square nuts, 3.80c.; steel tie plates, 2.25c.; angle bars, 2.75c.

Bolts, Nuts and Rivets.—December comes to an end with total specifications a trifle below those for November, but decidedly better than in the period from August to October. Releases for delivery in early January are more numerous, and the trade expects the present rate of shipments to be maintained, if not exceeded, in the coming month. Contracting for the first quarter has been completed, and prices are holding.

Coke.—Demand is steady and all ovens in this district are lighted. Prices, both on contracts and for spot sales are steady at $9, local ovens, and $9.50, delivered in the Chicago switching district.

Wire Rods.—A fair amount of contracting is under way at $43, Chicago.

Old Material.—Opinions as to the trend of the Chicago scrap market are at variance. In many instances consumers are willing to see the market strengthen, but they balk at advances of more than 25c. to 50c. above the low level that existed early in December. Large users of heavy melting steel are refusing offers at $12.50, while at the same time brokers do not hesitate to pay $12.75 per gross ton, delivered, against orders that were taken at $12.25. Purchasers by consumers are being made quietly and in small amounts. A weakness in the position of sellers is the fact that there is an ample supply of most grades, and this is revealed to melters through active solicitation on the part of brokers. Railroad shipments are steady, and sales of manufacturers' scrap are a trifle larger, this being noticeable in cast iron borings. But here again price resistance is strong, and consumers are turning down this grade at $10 a gross ton, delivered. The Burlington is advertising a list of 4100 tons.

Prices delivered consumers' yards, Chicago:

Per Gross Ton	
Basic Open-Hearth Grades:	
Heavy melting steel	$12.25 to $12.75
Shoveling steel	12.25 to 12.75
Frogs, switches and guards, cut apart, and miscellaneous rails	13.50 to 14.00
Hydraulic compressed sheets	10.75 to 11.25
Drop forge flashings	9.75 to 10.25
Forged, cast and rolled steel car-wheels	15.00 to 15.50
Railroad tires, charging box size	15.00 to 15.50
Railroad leaf springs, cut apart	15.00 to 15.50
Acid Open-Hearth Grades:	
Steel couplers and knuckles	13.75 to 14.25
Coil springs	15.50 to 16.00
Low phosphorus punchings	13.50 to 14.00
Electric Furnace Grades:	
Axle turnings	12.00 to 12.50
Blast Furnace Grades:	
Axle turnings	10.25 to 10.75
Cast iron borings	10.00 to 10.50
Short shoveling turnings	10.00 to 10.50
Machine shop turnings	7.50 to 8.00
Rolling Mill Grades:	
Iron rails	13.50 to 14.00
Rerolling rails	14.25 to 14.75
Cupola Grades:	
Steel rails less than 3 ft	14.75 to 15.25
Angle bars, steel	14.00 to 14.50
Cast iron carwheels	13.50 to 14.00
Malleable Grades:	
Railroad	13.00 to 13.50
Agricultural	12.00 to 12.50
Miscellaneous:	
*Relaying rails, 56 to 60 lb.	23.00 to 25.00
*Relaying rails, 65 lb. and heavier	26.00 to 31.00
Per Net Ton	
Rolling Mill Grades:	
Iron angle and splice bars	13.50 to 14.00
Iron arch bars and transoms	17.75 to 18.25
Iron car axles	20.50 to 21.00
Steel car axles	15.50 to 16.00
No. 1 railroad wrought	10.50 to 11.00
No. 2 railroad wrought	11.00 to 11.50
No. 1 busheling	9.50 to 10.00
No. 2 busheling	4.50 to 5.00
Locomotive tires, smooth	12.50 to 13.00
Pipes and flues	8.00 to 8.50
Cupola Grades:	
No. 1 machinery cast	14.00 to 14.50
No. 1 railroad cast	13.00 to 13.50
No. 1 agricultural cast	13.00 to 13.50
Stove plate	11.75 to 12.25
Grate bars	11.50 to 12.00
Brake shoes	11.50 to 12.00

*Relaying rails, including angle bars to match, are quoted f.o.b. dealers' yards.

Warehouse Prices, f.o.b. Chicago

	Base per Lb.
Plates and structural shapes	3.10c.
Soft steel bars	3.00c.
Reinforcing bars, billet steel	2.20c. to 2.65c.
Cold-finished steel bars and shafting—	
Rounds and hexagons	3.60c.
Flats and squares	4.10c.
Bands	3.65c.
Hoops	4.15c.
Black sheets (No. 24)	3.95c.
Galvanized sheets (No. 24)	4.80c.
Blue annealed sheets (No. 10)	3.50c.
Spikes, standard railroad	3.55c.
Track bolts	4.55c.
Rivets, structural	3.60c.
Rivets, boiler	3.60c.
	Per Cent Off List
Machine bolts	60
Carriage bolts	60
Coach or lag screws	60
Hot-pressed nuts, squares, tapped or blank	60
Hot-pressed nuts, hexagons, tapped or blank	60
No.8 black annealed wire, per 100 lb.	$3.20
Common wire nails, base per keg	$2.90 to 3.00
Cement coated nails, base per keg	2.90 to 3.00

New York

Orders for 11,500 Freight Cars Placed—Liberal Specifying in Steel

NEW YORK, Dec. 27.—The holiday season has adversely affected pig iron buying, and sales by local brokers during the week totaled only about 4000 tons. The General Electric Co. has closed against its inquiry for 3040 tons, a considerable portion of which was for delivery to its New England plants. No other first quarter business of consequence was placed. A number of large consumers in this district have not yet taken action on their first quarter needs, and it is thought likely that some of these belated contracts will be placed early in January. The price situation is unchanged.

Prices per gross ton, delivered New York district:

Buffalo No. 2 fdy., sil. 1.75 to 2.25	$21.41 to $21.91
East. Pa. No. 2 fdy., sil. 1.75 to 2.25	19.89 to 21.52
East Pa. No. 2 fdy., sil. 2.25 to 2.75	20.39 to 22.02
East Pa. No. 1X fdy., sil. 2.75 to 3.25	20.89 to 22.52

Freight rates: $4.91 from Buffalo, $1.39 to $2.52 from eastern Pennsylvania.

Cast Iron Pipe.—Recent efforts to stiffen prices on bell and spigot pipe have thus far been moderately successful. At the opening of bids by Boston on 1800 tons of water pipe the lowest American price was equivalent to about $29.50, base Birmingham. Activity has practically ceased during the holidays, but an early resumption of buying by public utilities is expected for the new year. Massapequa, Long Island, N. Y., is accepting bids on a contract for the installation of about 5250 tons of 6-in. to 12-in. water pipe. Centrifugal pipe will be considered.

Prices per net ton, delivered New York: Water pipe 6-in. and larger, $37.25 to $38.25; 4-in. and 5-in., $42.25 to $43.25; 3-in., $52.25 to $53.25; Class A and gas pipe, $4 to $5 extra.

Warehouse Business.—Buying has decreased slightly as a result of the holidays, but there is still a fair volume of tonnage moving from stock. Prices are unchanged. Some softness continues in warehouse prices on steel bars, when competition from imported material is encountered. Prices on black, galvanized and, occasionally, blue annealed sheets show slight variations, depending upon the desirability of the order.

Reinforcing Bars.—Awards were rather numerous in the week before Christmas, large jobs alone accounting for nearly 2000 tons. The largest of these was 600 tons for a subway repair shop in Manhattan. The volume of small orders was at about the same rate that has prevailed in the last few weeks, but indications are that December will be equal to November in total tonnage booked. Prices are unchanged.

Finished Steel.—Placing of orders for 11,550 freight cars has been the feature of the market in the last week. Of these 4750 cars were for the Southern, 2150 for the Louisville & Nashville, 3650 for the Sante Fe and 1000 for the Chicago & North Western. Promise of additional large inquiries for both freight and passenger cars early in the new year has given equipment makers better prospects than they have enjoyed in some time. While the week, with its holiday interruptions, has not been an active one in point of sales, specifications have continued to come in at a good rate, and by the end of the present week most of the orders on company books at the low prices of the summer and fall will have been specified. While this will make December a good month for most of the sales offices in this territory, it will also enable them to enter 1928 with prospects for better prices than have prevailed this year. The action of the Bethlehem Steel Co. in establishing mill bases on plates, shapes and bars has helped to stabilize prices on these products, and with the possibility of a further advance of $2 a ton on the Pittsburgh mill base, the tendency toward firmness has been accentuated. Advances in sheet prices, which have been generally adopted in this territory, seem to be holding so far as new orders are concerned, but there was considerable contracting for first quarter at much lower figures. New sheet business has been practically negligible in the last week, but specifications have been released at a fair rate. Introduction of the new card of extras on wire nails has aided in the establishment of the base price at 2.55c., Pittsburgh or Cleveland, and no shading of this price is reported. The demand for wire products is not brisk, but December business will probably be equal to, if not ahead of, November.

Mill prices per lb., delivered New York: Soft steel bars, 2.14c.; plates, 2.12½c.; structural shapes, 2.09½c.; bar iron, 2.14c.

Warehouse Prices, f.o.b. New York

	Base per Lb.
Plates and structural shapes	3.34c.
Soft steel bars and small shapes	3.24c.
Iron bars	3.24c.
Iron bars, Swedish charcoal	7.00c. to 7.25c.
Cold-finished shafting and screw stock—	
Rounds and hexagons	3.30c.
Flats and squares	3.80c.
Cold-rolled strip, soft and quarter hard,	6.00c. to 6.25c.
Hoops	4.49c.
Bands	3.99c.
Blue annealed sheets (No. 10 gage),	3.84c. to 3.89c.
Long terne sheets (No. 24 gage)	5.80c.
Standard tool steel	12.00c.
Wire, black annealed	4.50c.
Wire, galvanized annealed	5.15c.
Tire steel, 1½ x ½ in. and larger	3.30c.
Smooth finish, 1 to 2½ x ¼ in. and larger	3.65c.
Open-hearth spring steel, bases	4.50c. to 7.00c.

Machine bolts, cut thread:	Per Cent Off List
¾ x 6 in. and smaller	55 to 60
1 x 30 in. and smaller	50 to 50 and 10
Carriage bolts, cut thread:	
½ x 6 in. and smaller	55 to 60
¾ x 20 in. and smaller	50 to 50 and 10
Coach screws:	
½ x 6 in. and smaller	55 to 60
1 x 16 in. and smaller	50 to 50 and 10

Boiler Tubes—	Per 100 Ft.
Lap welded steel, 2-in.	$17.33
Seamless steel, 2-in.	20.24
Charcoal iron, 2-in.	25.00
Charcoal iron, 4-in.	67.00

Discounts on Welded Pipe

Standard Steel—	Black	Galv.
½-in. butt	46	29
¾-in. butt	51	37
1-3-in. butt	53	39
2½-6-in. lap	48	35
7 and 8-in. lap	44	17
11 and 12-in. lap	37	12
Wrought Iron—		
½-in. butt	5	+19
¾-in. butt	11	+ 9
1-1½-in. butt	14	+ 6
2-in. lap	5	+14
3-6-in. lap	11	+ 6
7-12-in. lap	3	+16

Tin Plate (14 x 20 in.)

	Prime	Seconds
Coke, 100 lb. base box	$6.45	$6.20
Charcoal, per box—	A	AAA
IC	$9.70	$12.10
IX	12.00	14.25
IXX	13.90	16.00

Terne Plate (14 x 20 in.)

IC—20-lb. coating	$10.00 to $11.00
IC—30-lb. coating	12.00 to 13.00
IC—40-lb. coating	13.75 to 14.25

Sheets, Box Annealed—Black, C. R. One Pass

	Per Lb.
Nos. 18 to 20	3.90c. to 4.00c.
No. 22	4.05c. to 4.15c.
No. 24	4.10c. to 4.20c.
No. 26	4.20c. to 4.30c.
No. 28*	4.35c. to 4.45c.
No. 30	4.60c. to 4.70c.

Sheets, Galvanized

	Per Lb.
No. 14	4.35c.
No. 16	4.45c.
No. 18	4.50c. to 4.60c.
No. 20	4.65c. to 4.75c.
No. 22	4.70c. to 4.80c.
No. 24	4.85c. to 4.95c.
No. 26	5.10c. to 5.20c.
No. 28*	5.35c. to 5.45c.
No. 30	5.75c. to 5.85c.

*No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.

Coke.—Standard foundry coke is inactive, and the market for prompt shipment material is substantially unchanged at $4 per net ton, Connellsville, with special brands ranging up to $5.25. Standard furnace coke is slightly firmer, and some contracting is reported to have been done at $2.85 to $3 per ton, Connellsville. Delivered prices on Connellsville foundry coke are: To northern New Jersey, $8.03; to New York or Brooklyn, $8.79; to Newark or Jersey City, N. J., $7.91. By-product foundry coke prices are unchanged at $9.45 to $9.85 per net ton, delivered Newark or Jersey City, but some buyers claim to have secured concessions.

Old Material.—Only a moderate tonnage of scrap is moving to consumers, and not much improvement in demand is expected until after the first of the year. Prices are unchanged except on mixed borings and turnings, which show a slight advance in the minimum quotation as a result of offers of $10, instead of $9.50, per ton on shipments to Swedeland, Pa. No. 1 heavy melting steel is still being purchased at $13.50 per ton, delivered eastern Pennsylvania, and yard grade, at $10.50 to $10.75 per ton, delivered.

Dealers' buying prices per gross ton, New York:

No. 1 heavy melting steel	$10.00 to $10.85
Heavy melting steel (yard)	6.25 to 7.25
No. 1 heavy breakable cast	11.25 to 12.00
Stove plate (steel works)	8.25 to 8.50
Locomotive grate bars	8.25 to 8.50
Machine shop turnings	6.50 to 7.50
Short shoveling turnings	6.50 to 7.50
Cast borings (blast furnace or steel works)	6.75 to 7.25
Mixed borings and turnings	6.50 to 7.50
Steel car axles	16.00 to 17.00
Iron car axles	23.75 to 24.75
Iron and steel pipe (1 in. diam., not under 2 ft. long)	8.75 to 9.25
Forge fire	6.50 to 7.00
No. 1 railroad wrought	10.50 to 11.00
No. 1 yard wrought, long	9.00 to 9.50
Rails for rolling	10.50 to 11.00
Cast iron carwheels	11.25 to 11.75
Stove plate (foundry)	8.75 to 9.25
Malleable cast (railroad)	10.00 to 10.50
No. 1 machinery cast	$13.50 to $14.00
Cast borings (chemical)	11.00 to 12.00

Prices per gross ton, delivered local foundries:

No. 1 heavy cast (columns, building materials, etc.), cupola size	11.50 to 12.00
No. 2 cast (radiators, cast boilers, etc.)	11.00 to 11.50

Philadelphia

Specifications for Steel Coming to Mills at a Good Rate

PHILADELPHIA, Dec. 27.—Year-end business in steel is confined almost entirely to specifications against fourth quarter contracts, with sales representatives of the mills prodding buyers to send their shipping instructions in before the end of this week, else unspecified tonnage will be cancelled. Consumers and jobbers are naturally specifying quite willingly against low-priced contracts for structural shapes, bars and sheets, but on plates the situation is slightly different in that fourth quarter contracts were in most instances made at 1.75c., Pittsburgh, with some at 1.70c., whereas the new delivered price of 2.05c., Philadelphia, is equivalent to 1.73c., Pittsburgh.

Pig iron and scrap remain extremely dull, with prices the same as a week ago.

Pig Iron.—Sales of foundry iron within the week have amounted to a few thousand tons at unchanged prices. Transactions were of small size, usually from a carload to 100 tons. No inquiry of importance is before the trade. Quotations on foundry grades are uniformly $19, base, furnace.

Prices per gross ton at Philadelphia:

East. Pa. No. 2 plain, 1.75 to 2.25 sil.	$19.76 to $20.26
East. Pa. No. 2X, 2.25 to 2.75 sil.	20.26 to 20.76
East. Pa. No. 1X	20.76 to 21.26
Basic (delivered eastern Pa.)	19.50 to 19.75
Gray forge	19.50 to 20.00
Malleable	21.00 to 21.50
Standard low phos. (f.o.b. New York State furnace)	23.00 to 24.00
Copper bearing low phos. (f.o.b. furnace)	23.50 to 24.00
Virginia No. 2 plain, 1.75 to 2.25 sil.	25.29 to 25.54
Virginia No. 2X, 2.25 to 2.75 sil.	25.79 to 26.04

Prices, except as specified otherwise, are delivered Philadelphia. Freight rates: 76c. to $1.64 from eastern Pennsylvania furnaces; $4.54 from Virginia furnaces.

Ferromanganese.—Contracting for first half continues on a small scale at $100, seaboard. Many consumers have ordered in sufficient supplies this month to carry them through a part of first quarter.

Plates.—Eastern mills have made additional contracts for first quarter at 2.05c., delivered Philadelphia, based on 1.95c. at Coatesville, but their principal activity this week is urging customers to get in specifications against fourth quarter contracts which expire Dec. 31. Buyers have been notified that any unspecified tonnage will be cancelled.

Structural Shapes.—Specifications against low-priced fourth quarter contracts have been fairly heavy. Bookings in December will be larger than in November. While the placing of specific tonnages for construction work has been at a low point, the mills expect that the ordering in of steel, some of which is for stock, against expiring contracts will give them good-sized backlogs for January. First quarter contracts are being made on the basis of 1.95c., Bethlehem, or 2.08c., delivered Philadelphia.

Old Material.—Based largely on hopes and expectations, rather than on actual developments, the scrap market presents a firmer tone. Brokers are not anxious sellers, preferring to await events in the new year that may bring a larger demand for scrap. Prices remain as quoted a week ago.

Prices per gross ton delivered consumers' yards, Philadelphia district:

No. 1 heavy melting steel	$13.50 to $14.00
Scrap T rails	13.00 to 13.50
No. 2 heavy melting steel	11.00 to 11.50
No. 1 railroad wrought	15.25 to 15.75
Bundled sheets (for steel works)	10.50 to 11.00
Machine shop turnings (for steel works)	11.00
Heavy axle turnings (or equivalent)	12.00 to 12.50
Cast borings (for steel works and rolling mill)	11.00 to 11.25
Heavy breakable cast (for steel works)	15.50 to 16.00
Railroad grate bars	12.50
Stove plate (for steel works)	12.50
No. 1 low phos., heavy, 0.04 per cent and under	18.00 to 18.50
Couplers and knuckles	16.00
Rolled steel wheels	15.50 to 16.00
No. 1 blast furnace scrap	10.00 to 10.50
Machine shop turnings (for rolling mill)	11.00 to 11.50
Wrought iron and soft steel pipes and tubes (new specifications)	13.00 to 13.50
Shafting	17.50 to 18.00
Steel axles	19.00 to 20.00
No. 1 forge fire	11.00
Steel rails for rolling	15.00 to 15.50
Cast iron carwheels	15.50
No. 1 cast	16.00 to 16.50
Cast borings (for chemical plant)	15.00 to 15.50

Bars.—Fourth quarter contracts for steel bars were generally made at 1.75c., Pittsburgh, and as the price for first quarter is 1.80c., buyers are specifying fully against these lower-priced arrangements. The total for the month is expected to be larger than was booked by local sales offices in November.

Sheets.—First quarter prices on sheets, now quite generally quoted by all producers, are 2.90c. for black,

Warehouse Prices, f.o.b. Philadelphia

	Base per Lb.
Plates, ¼-in. and heavier	2.50c. to 2.60c.
Plates, ³⁄₁₆-in.	2.80c. to 3.00c.
Structural shapes	2.50c. to 2.60c.
Soft steel bars, small shapes and iron bars (except bands)	2.50c. to 2.60c.
Round-edge iron	3.50c.
Round-edge steel, iron finished, 1½ x 1½ in.	3.50c.
Round-edge steel, planished	4.30c.
Reinforcing steel bars, square, twisted and deformed	2.50c. to 3.00c.
Cold-finished steel, rounds and hexagons	3.25c. to 5.25c.
Cold-finished steel, squares and flats	3.75c. to 5.75c.
Steel hoops	3.85c. to 4.15c.
Steel bands, No. 12 gage to ⅛-in., inclusive	3.60c. to 3.90c.
Spring steel	5.00c.
Black sheets (No. 24)	4.25c. to 4.35c.
Galvanized sheets (No. 24)	5.10c. to 5.20c.
Blue annealed sheets (No. 10)	3.20c. to 3.30c.
Diamond pattern floor plates— ¼-in.	5.30c.
³⁄₁₆-in.	5.50c.
Rails	3.20c.
Swedish iron bars	6.60c.

3.75c. for galvanized and 2.10c. for blue annealed (up to 40 in.), Pittsburgh base. Some buyers have objected to the extra of 10c. per 100 lb. on blue annealed sheets wider than 40 in., but the answer of steel companies to this is that blue annealed sheets would have been quoted at not less than 2.20c. for all widths had it not been for the competition of the continuous mills on the narrow sizes. Specifications against fourth quarter contracts have been received during the week at a good rate.

Imports.—Last week's receipts of foreign pig iron were 860 tons, of which 507 tons came from India and 353 tons from the Netherlands. Iron and steel imports totaled 1369 tons divided as follows: Steel blooms from France, 534 tons; strips from Germany, 506 tons; bar iron from Sweden, 10 tons; steel bars from Belgium, 40 tons; steel bars from France, 18 tons; structural shapes from Belgium, 167 tons, from France, 94 tons.

Cleveland

Active Buying of Pig Iron by Automotive Industry

CLEVELAND, Dec. 27.—Specifications for steel bars, plates and structural material for January rolling have continued good in the past week, and there has been some increase in mill operations. Most producers have enough tonnage on their books to assure them good operations through January, as most of the business against which specifications are now being received was taken at 1.75c., Pittsburgh. The current price of 1.80c. will not apply on much of the steel shipped in January. A fair volume of business in current small orders is being placed at 1.80c., however. This is coming from the smaller consumers who usually do not place contracts, but some of these are now contracting for the quarter. Specifications are slow from some of the smaller plate consumers, who evidently prefer to order steel as needed at the market price rather than to stock up at $1 a ton lower price.

An optimistic feeling prevails in the steel trade, and this is due largely to expectations of a very heavy demand next year from the automotive industry. This industry is buying pig iron in a volume that indicates heavy production schedules, and this is regarded as a forerunner of heavy buying of steel. Many new car models are coming out which are expected to give an impetus to retail sales early in the year, while a record-breaking production of motor cars is looked for in 1928.

The steel trade is somewhat disappointed over the delay of the Ford Motor Co. in getting up to a fair production. It is not believed that this company will be on a good production schedule before spring.

Additional structural work in connection with the Cleveland Union Terminals project, involving 7000 tons, was placed during the week. New inquiry in this field is light. Lake shipbuilders are figuring on a small boat requiring 1300 tons of steel.

Outside mills are holding firmly to 1.80c. for steel bars, plates and structural material, while 1.80c., Cleveland, is the ruling local mill quotation on steel bars. This is being shaded in some cases to 1.75c., and an outside Ohio mill is meeting the lower price on steel bars of forging quality. In alloy steel, concessions have appeared on chrome vanadium spring steel.

Warehouse Prices, f.o.b. Cleveland

	Base per Lb.
Plates and structural shapes	3.00c.
Soft steel bars	3.00c.
Reinforcing steel bars	2.25c. to 2.75c.
Cold-finished rounds and hexagons	3.65c.
Cold-finished flats and squares	4.15c.
Hoops and bands	3.65c.
Cold-finished strip	*5.95c.
Black sheets (No. 24)	3.75c.
Galvanized sheets (No. 24)	4.40c. to 4.50c.
Blue annealed sheets (No. 10)	3.25c.
No. 9 annealed wire, per 100 lb.	$2.90
No. 9 galvanized wire, per 100 lb.	3.35
Common wire nails, base per keg	2.90

*Net base, including boxing and cutting to length.

Pig Iron.—The plans of the automotive industry for a large increase in production early in the year have proved a great stimulus to the pig iron market. Buying by this industry, which did not start until business from some of the other sources began tapering off, was heavy in the past week, during which Cleveland interests sold over 45,000 tons of foundry and malleable iron, or a little less than during the previous week. Included were several lots of around 5000 tons. While a large part of the business came from the Michigan automobile foundries, there was a fair sprinkling of orders from Indiana and western Ohio. One producer has sold more pig iron this month than in any month since the record-breaking month of June, 1925. Good shipping orders are coming from the automotive industry, and one producer reports that it will ship as much iron this month as in any previous month this year, although with the approach of inventory time December shipments usually fall off. Among inquiries is one from Benton Harbor, Mich, for 6000 tons of foundry and malleable iron. The market has a firmer tone, and Lake furnaces seem inclined to hold to a minimum of $16.75 for foundry and malleable grades. For shipment to some points $17, furnace, is the ruling price.

Prices per gross ton at Cleveland:

N'th'n No. 2 fdy., sil. 1.75 to 2.25	$18.50
Southern fdy., sil. 1.75 to 2.25	22.00
Malleable	18.50
Ohio silvery, 8 per cent	28.00
Basic, Valley furnace	17.00
Standard low phos., Valley furnace	$26.50 to 27.00

Prices, except on basic and low phosphorus, are delivered Cleveland. Freight rates: 50c. from local furnaces; $3 from Jackson, Ohio; $6 from Birmingham.

Old Material.—Dealers are still taking a firm stand on prices and seem hopeful of getting a little more money for their scrap when some new demands develop, which they look for in January. However, in their price attitude dealers are receiving no support from the mills. While consumers are operating better, they point out that they are tied up for some time with low-price business and are not justified in paying more for scrap. The only activity during the week was small-lot buying by dealers against contracts for heavy melting steel at $13.75. There is no demand for blast furnace grades.

Prices per gross ton, delivered consumers' yards:

Basic Open-Hearth Grades	
No. 1 heavy melting steel	$13.50 to $13.75
No. 2 heavy melting steel	13.00 to 13.25
Compressed sheet steel	12.75 to 13.00
Light bundled sheet stampings	11.50 to 11.75
Drop forge flashings	12.50 to 13.00
Machine shop turnings	9.00 to 9.25
No. 1 railroad wrought	11.50 to 12.00
No. 2 railroad wrought	13.50 to 13.75
No. 1 busheling	11.50 to 12.00
Pipes and flues	9.00 to 9.50
Steel axle turnings	12.50 to 13.00
Acid Open-Hearth Grades	
Low phosphorus forging crops	16.50 to 17.00
Low phosphorus, billet, bloom and slab crops	17.00 to 17.50
Low phosphorus sheet bar crops	16.50 to 17.00
Low phosphorus plate scrap	16.00 to 16.50
Blast Furnace Grades	
Cast iron borings	10.00 to 10.50
Mixed borings and short turnings	10.00 to 10.50
No. 2 busheling	10.00 to 10.50
Cupola Grades	
No. 1 cast	16.00 to 16.50
Railroad grate bars	11.00 to 12.00
Stove plate	12.00 to 12.50
Rails under 3 ft	18.00 to 18.50
Miscellaneous	
Railroad malleable	15.00 to 15.50
Rails for rolling	16.25 to 16.50

Bolts, Nuts and Rivets.—Specifications are still slow, but makers expect a considerable pick-up after the first of the year. Good rivet specifications against fourth quarter contracts were placed during the week by some of the railroads and shipbuilders. Consumers quite generally are signing first quarter contracts for large rivets at $2.75 per 100 lb., Cleveland.

Coke.—By-product coke for domestic use is moving a little more freely, the cooler weather having stimulated business. Prices, however, are irregular, as makers are required to meet competitive situations at various consuming points. Foundry coke is unchanged. There is a range of from $2.90 to $3.25, ovens, on heating coke.

Reinforcing Bars.—New business is limited to small lots. Rail steel bars are unchanged at 1.65c. to 1.70c., mill. The price of 1.75c., Cleveland, on billet steel bars has not entirely disappeared.

Semi-Finished Steel. — While first quarter prices have not been formally named, a local producer is taking specifications for sheet bars, billets and slabs at current prices for deliveries that will extend into next month, and expects to continue these prices.

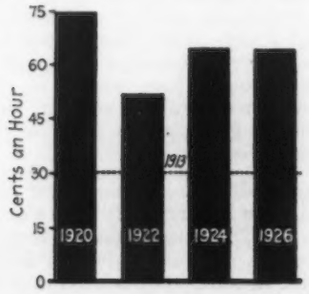
Sheets.—Specifications are coming out in good volume for January shipment, but there is not much new business, as most consumers covered before the recent advance. While the new prices appear to be holding for future delivery, they are being shaded for prompt shipment business. On black sheets 2.80c., Pittsburgh, is the ruling price for early shipment. Galvanized sheets are slightly firmer, and some of the mills that have been going to 3.65c., Valley, are trying to get that price using a Pittsburgh basing point. Automobile body sheets are quoted at 4c., Pittsburgh, for the first quarter, with some mills trying to get 4.15c. for small lots. Metal furniture sheets are being quoted for the first quarter at 4.05c. for "A" grade and 3.85c. for "B."

Strip Steel.—Specifications for hot-rolled strip steel have increased, but there is not much new business, as most buyers are under contract. The market shows a little firmer tone, and it seems doubtful if mills would now shade 1.80c., Pittsburgh, for 6-in. to 12-in. strip. For material under 6 in. 2c. is the ruling quotation. Some of the mills are asking 2.20c. for hoops in light gages. Cold-rolled strip is steady at 2.75c., Cleveland, for 3 tons and over and 3c. to 3.15c. for small lots.

WAGES AND HOURS IN STEEL

Variations in the Post-War Years Compared With 1913 — Hourly and Weekly Rates

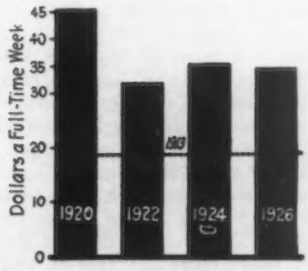
COVERING a study of 75,109 employees in 199 iron and steel plants, the United States Bureau of Labor Statistics has put out figures relating to wages and hours of labor. The figures are given for each of the



Average Steel Mill Hourly Wages at Biennial Intervals, Compared with Those Prevalent in 1913

ten principal departments of the industry and make comparisons of 1926 with preceding years, both before the war and after. The report is covered in Bulletin No. 442.

For the industry as a whole the average earnings reached a peak in 1920 at 74.5c. an hour. Since that time they have declined—to 51.3c. in 1922—and then risen to 64.4c. in 1924 and 63.7c. in 1926. The comparative figure for 1913 was about 30c. Earnings by department in 1926, as compared with 1924, are found



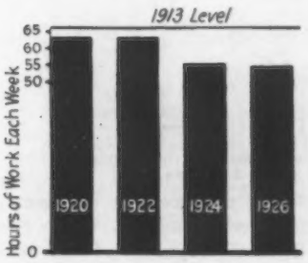
Changes in Average Contents of Steel Mill Pay Envelopes for a Full-Time Week

in one of the tables, which gives the percentage of increase or decrease between the two years.

Average full-time earnings for the entire industry have gone up from $18.89 in 1913, reaching $45.65 in 1920. Since then they have been much lower, at $31.67 in 1922, $35.22 in 1924, and $34.41 in 1926. It will be noted that the gain between 1922 and 1924 was much less proportionately in the weekly earnings than in the hourly earnings. This is due to the decrease in average working hours, following the adoption of the universal 8-hr. day.

Employees in 1913 worked an average full-time week of 66.1 hr. This has undergone an irregular downward change, reaching 63 hr. in 1922. Following the 1923 action with regard to the 8-hr. day there was a general decrease, bringing the figure to 55.2 hr. in 1924 and 54.4 hr. in 1926.

Three diagrams show the relationships of 1920 to



Length of Average Working Week in the Steel Industry at Various Dates

1922, 1924 and 1926, and indicate the 1913 level in each case. These diagrams cover hourly wages, weekly wages and length of the average working week.

Protest Export Rate Suspension

Protest against the suspension of reduced export rates on iron and steel articles from Central Freight Association territory to the North Atlantic territory has been made by the traffic department of the Cincinnati Chamber of Commerce in a petition filed in behalf of the American Rolling Mill Co. and other steel companies in the Cincinnati district. The petition for suspension of the rates was filed by the Bethlehem Steel Co. on the ground that the reduced rates constituted a violation of the long and short haul clause in favor of a single locality or a group of producers, and that the reduction will impair the carriers' revenues, making the rates practically non-compensatory.

Samuel Herndon, traffic manager Cincinnati Chamber of Commerce, in his petition, denies the claim of reduced revenue, showing that the loss because of the new rate would be only $4.15 a car and that this loss of revenue would be offset 30 times by each additional car of tonnage which would be created by the reduction of the rates.

EARNINGS AND WORKING TIME

	Average Earnings: In One Hour	Average Earnings: Full-Time Week	Average Week, Hours
1913	30.0c.	$18.89	66.1
1914	...	....	64.9
1915	...	....	65.5
1920	74.5	45.65	63.1
1922	51.3	31.67	63.0
1924	64.4	35.22	55.2
1926	63.7	34.41	54.4

HOURLY EARNINGS IN VARIOUS DEPARTMENTS

Department	1924	1926	Per Cent of Change: Increase	Per Cent of Change: Decrease
Blast furnace	52.0	51.7	...	0.6
Bessemer converters	62.4	64.1	2.7	...
Open-hearth furnaces	63.5	67.7	6.7	...
Puddling mills	72.1	65.7	...	8.9
Blooming mills	61.3	62.7	2.3	...
Plate mills	56.2	60.6	7.8	...
Bar mills	58.5	59.1	1.0	...
Rail mills	57.3	59.5	3.9	...
Sheet mills	80.9	75.9	...	6.2
Tin plate mills	79.5	70.4	...	11.5

Boston

Heavier Pig Iron Buying for First Quarter—Advances in Scrap

BOSTON, Dec. 27.—The General Electric Co. has bought 1400 tons of No. 1X pig iron from the Everett furnace, of which 500 tons was for its Lynn, Mass., plant, 300 tons was for Everett, and 600 tons for Pittsfield. This sale and others brought the Mystic company's total bookings for the week up to approximately 4000 tons. A New York State stack sold more than 1200 tons of miscellaneous grades of iron. In addition, about 1000 tons of Buffalo iron was sold, together with 600 tons of Southern and smaller tonnages from other sources, so that aggregate sales in this section approximated 7000 tons for the week. All of the iron bought was for first quarter delivery, the spot market being lifeless. Buffalo foundry iron is still available at $16 to $17 a ton, base furnace, and furnaces east of Buffalo are meeting that competition. Silicon differentials continue to be waived, but on No. 2X iron the equivalent of $16.50 on cars, Buffalo, appears to be the lowest price quoted. Virginia irons are somewhat lower, but are still far out of line with prices quoted by furnaces at Buffalo and east of Buffalo. Alabama furnaces are booking first quarter iron, although books for that period have not been formally opened. Little foreign iron is being offered.

Prices of foundry iron per gross ton, delivered to most New England points:

Buffalo, sil. 1.75 to 2.25	$20.91 to $21.91
Buffalo, sil. 2.25 to 2.75	21.41 to 21.91
East. Penn., sil. 1.75 to 2.25	22.65 to 23.15
East. Penn., sil. 2.25 to 2.75	23.15 to 23.65
Virginia, sil. 1.75 to 2.25	25.71
Virginia, sil. 2.25 to 2.75	26.21
Alabama, sil. 1.75 to 2.25	22.91 to 24.77
Alabama, sil. 2.25 to 2.75	23.41 to 25.27

Freight rates: $4.91 from Buffalo, $3.65 from eastern Pennsylvania, $5.21 all rail from Virginia, $6.91 to $8.77 from Alabama.

Imports.—In the first half of December 594 tons of Dutch pig iron was received at this port, which compares with 300 tons of Dutch and 199 tons of Indian, or a total of 499 tons imported in the first half of last month, and 406 tons of Dutch iron received in the first half of December, last year. Imports of ore in the first half of December consisted of 8850 tons of Wabana, as against no ore receipts in the first half of November, this year, and 17,379 tons in the first half of December, last year. It is evident that the New England blast furnace is buying less foreign ore and more from eastern New York State. Two lots of European coal, totaling 4958 tons, were received at Boston between Dec. 1 and 15, contrasted with 4773 tons for the corresponding period last month.

Coke.—If the recent reduction in by-product foundry coke from $12 a ton to $11.50, delivered within a $3.10 freight rate zone, by the New England Coal & Coke Co. and the Providence Gas Co. was for the purpose of boosting shipments, the effort so far has failed. Both companies state that the reduction was in keeping with the general foundry situation, which would bear out recent reports of a decrease in the New England iron melt and small earnings by foundries. There has been some specifying of fuel for winter storage in the past week or ten days, but not enough to offset a further slump in New England iron melt and coke consumption.

Cast Iron Pipe.—Four companies, the Warren Foundry & Pipe Co., R. D. Wood & Co., the United States Cast Iron Pipe & Foundry Co. and B. Nicoll & Co., Inc., bid on 900 tons of 8-in. Class B, 50 tons of 10-in., 800 tons of 12-in. and 50 tons of 30-in., a total of 1800 tons of pipe, and 50 tons of special castings required by Boston, bids for which were opened Dec. 21. B. Nicoll & Co., Inc., were the lowest bidders, and the Warren Foundry & Pipe Co. was low bidder on American made pipe. The bids were as follows:

	Warren	United States	Wood	Nicoll
8 in.	$39.49	$39.90	$40.40	$29.25
10 in.	39.49	39.90	40.40	29.25
12 in.	39.49	39.90	40.40	39.25
30 in.	39.49	....	40.40	38.75
Castings	112.00	115.00	116.00	100.00

New Britain, Conn., has awarded 600 tons of 6 to 12-in. pipe to the Warren Foundry & Pipe Co. That company was the low bidder on 200 tons of fittings wanted by Boston. Fall River, Mass., has placed 300 tons of 6 to 12-in. pipe. Private business is of fairly large volume, with prices above those quoted on the Boston tonnage. A concern operating several New England lighting and heating companies is about to close on 3000 tons of gas pipe.

Cold-Rolled Strip Steel.—Business is no better this week. Mills report that there is every reason to expect improvement after Jan. 1. The price situation is reasonably firm. Owing to the lack of buying, Western mills have been less active in soliciting business in New England, and the quotation of 3.25c. per lb., Worcester, Mass., seems to have disappeared, temporarily at least.

Mill Prices on Cold-Rolled Strip in North Atlantic States: In 1 to 3-ton lots, 3.25c. per lb., base Pittsburgh, and also, 3.25c. to 3.40c. per lb., base Worcester, Mass.

Old Material.—The movement of old material out of New England is no greater than it was a week ago, but sentiment is better and prices, with one or two exceptions, are firmer. No. 1 heavy melting steel is moving at $14.50 a ton, delivered eastern Pennsylvania, and at $15.50, delivered Pittsburgh district, which figures back to around $9 to $9.25 a ton on cars here, or 25c. to 50c. higher than a week ago, while yard steel is up 50c. a ton, at $7.50 to $8 a ton on cars. Such materials as steel mill borings, steel turnings, mixed borings and turnings and forge scrap have advanced 25c. a ton on moderate buying by brokers. Additional small sales of textile machinery cast are noted at $14.50, $15 and $15.50 a ton, delivered. Chemical borings appear to be the one really weak spot in the market, a lack of demand having forced prices off a little in the past day or so. The Boston & Main Railroad is offering 100 cars of miscellaneous material, and one of the large Massachusetts railroad companies, a fairly heavy tonnage.

Buying prices per gross ton f.o.b. Boston rate shipping points:

No. 1 heavy melting steel	$9.00 to $9.25
Scrap rails	8.75 to 9.00
No. 1 railroad wrought	10.00 to 10.50
No. 1 yard wrought	8.50 to 9.00
Machine shop turnings	6.00 to 6.25
Cast iron borings (steel works and rolling mill)	6.00 to 6.25
Bundled skeleton, long	5.60 to 6.00
Forge flashings	6.00 to 6.50
Blast furnace borings and turnings	6.00 to 6.25
Forge scrap	6.00 to 6.50
Shafting	13.00 to 13.50
Street car axles	16.00 to 17.00
Wrought pipe (1 in. in diameter, over 2 ft. long)	7.50 to 8.00
Rails for rerolling	10.00 to 10.50
Cast iron borings, chemical	9.50 to 10.00

Prices per gross ton delivered consumers' yards:

Textile cast	$14.50 to $15.50
No. 1 machinery cast	14.50 to 15.00
No. 2 machinery cast	12.50 to 13.00
Stove plate	11.00 to 11.50
Railroad malleable	13.50 to 14.00

Warehouse Prices, f.o.b. Boston

	Base per Lb.
Plates	3.365c.
Structural shapes—	
Angles and beams	3.365c.
Tees	3.365c.
Zees	3.465c.
Soft steel bars and small shapes	3.265c.
Flats, hot-rolled	4.15c.
Reinforcing bars	3.265c. to 3.54c.
Iron bars—	
Refined	3.265c.
Best refined	4.60c.
Norway, rounds	6.60c.
Norway, squares and flats	7.10c.
Spring steel—	
Open-hearth	5.00c. to 10.00c.
Crucible	12.00c.
Tire steel	4.50c. to 4.75c.
Bands	4.015c. to 5.00c.
Hoop steel	5.50c. to 6.00c.
Cold rolled steel—	
Rounds and hexagons	4.05c.
Squares and flats	4.55c.
Toe calk steel	6.00c.
Rivets, structural or boiler	4.50c.
	Per Cent Off List
Machine bolts	50 and 5
Carriage bolts	50 and 5
Lag screws	50 and 5
Hot-pressed nuts	50 and 5
Cold-punched nuts	50 and 5
Stove bolts	70 and 10

San Francisco

Eastern Mill Bases on Plates and Shapes Reflected in Coast Prices

SAN FRANCISCO, Dec. 24 (*By Air Mail*).—Steel bookings during the past week were of fair proportions for this time of the year and included 2500 tons of shapes for the Firestone Tire & Rubber Co. plant in Los Angeles, secured by Llewellyn Iron Works; 800 tons for a bridge for the Western Pacific Railroad at San Francisco, taken by the United States Steel Products Co.; 600 tons of shapes for an apartment on Leavenworth Street, San Francisco, awarded to the Pacific Coast Engineering Co., and 620 tons of plates for a pipe line at Ventura, Cal., the general contract for which was placed with Claude Fisher, Los Angeles. New inquiries that developed during the week involved 600 tons for a building at Cristobal, Canal Zone, for the Government, on which bids open Dec. 28; 800 tons of shapes for the Alexander and Baldwin Building, Honolulu, Hawaii, bids on which are to be opened Jan. 14, and 2825 tons of cast iron pipe for Portland, Ore., up for figures on Jan. 5.

Both plate and shape prices on the Coast have been reduced following the recent announcement of Bethlehem Steel Co. regarding its new quotations of 1.95c., base Sparrows Point, on plates and 1.95c., base Bethlehem, on structural shapes. The c.i.f. price on shapes is now 2.35c., a drop of $1 a ton from the old level, while plates are quoted generally at 2.30c., c.i.f., also a drop of $1 a ton.

Pig Iron.—Foundry activity has shown little improvement of late, and as a result demand for pig iron is by no means large. Prices remain unchanged.

Prices per gross ton at San Francisco:

*Utah basic	$25.00 to $26.00
*Utah foundry, sil. 2.75 to 3.25	25.00 to 26.00
**Indian foundry, sil. 2.75 to 3.25	25.00
**German foundry, sil. 2.75 to 3.25	24.25

*Delivered San Francisco.
**Duty paid, f.o.b. cars San Francisco.

Structural Shapes.—Over 17,000 tons of structural shapes is up for quotations or pending, and a good portion of this tonnage is expected to be placed during the last week of the year. In addition to the awards listed above, a fair number of projects calling for from 20 to 40 tons have been placed. Plain material has been reduced $1 a ton from 2.40c. to 2.35c., c.i.f. Coast ports, following the adoption of mill bases by the Bethlehem Steel Co.

Plates.—Outstanding in the market this week was the award of the first tonnage of plates in excess of 100 tons in over seven weeks. This was approximately 620 tons of plates for a pipe line at Ventura, Cal., the general contract for which was placed with Claude Fisher, Los Angeles. Bids have been opened on 3000 tons for a pipe line at Port Townsend, Wash., and the Steel Tank & Pipe Co., Berkeley, Cal., was low bidder. The leading interest and the Bethlehem Steel Co. are now generally quoting 2.30c., c.i.f., on plates, and as low as 2.25c. has been reported on desirable tonnages.

Bars.—No award has been made, as yet, on the 8500-ton inquiry of the Raymond Concrete Pile Co. for the Coyote Point bridge, San Francisco. It is reported that an Eastern producer will secure the business. Most reinforcing bar awards during the week were confined to small lots. Out-of-stock prices in the San Francisco district continue at a low level, and 2.25c. per lb. continues to be quoted on large lots.

Warehouse Prices, f.o.b. San Francisco

	Base per Lb.
Plates and structural shapes	3.15c.
Soft steel bars	3.15c.
Small angles, ⅞-in. and over	3.15c.
Small angles, under ⅞-in.	3.55c.
Small channels and tees, ¾-in. to 2¾-in.	3.75c.
Spring steel, ¼-in. and thicker	5.00c.
Black sheets (No. 24)	4.80c.
Blue annealed sheets (No. 10)	3.75c.
Galvanized sheets (No. 24)	5.35c.
Structural rivets, ½-in. and larger	5.65c.
Common wire nails, base per keg	$3.35
Cement coated nails, 100-lb. keg	3.35

Cast Iron Pipe.—Of major importance in the market this week is an inquiry from Portland, Ore., for 2825 tons of 6 to 24-in. Class B pipe, bids on which will be opened Jan. 5. This is one of the largest inquiries that has come up during the year. Only three awards of over 100 tons were reported, as follows: 100 tons of 8 and 10-in. Class B pipe for Arcadia, Cal., placed with the American Cast Iron Pipe Co.; 340 tons of 4 to 8-in. pipe for the Ravenswood Water District, Redwood City, Cal., awarded to E. W. Redman, and 135 tons of 6-in. Class B pipe for the improvement of Winona Avenue, San Diego, Cal., taken by V. R. Dennis Construction Co. B. Nicoll & Co. were low bidders on 1856 tons of 6 and 8-in. Class C pipe for Los Angeles, but the city may decide to purchase Class 350 centrifugal pipe. Nogales, Ariz., will open bids on Jan. 5 for 373 tons of 2 to 10-in. Class B or centrifugal pipe. Bids have been opened at Santa Ana, Cal., for 231 tons of 6 to 12-in. Class B pipe, and Eureka and Belmont, Cal., will open bids on Jan. 3 and 9 respectively for 120 tons of 6 and 10-in. and 188 tons of 4 to 8-in. Class B pipe.

Steel Pipe.—Activity in this market is limited, in the main, to sales and inquiries requiring small tonnages. The Grinnell Co. was low bidder at 89c. per ft. on 50,000 ft. of 8-in. seamless pipe for Los Angeles.

Rails.—The Southern Pacific Co., San Francisco, has awarded additional tonnages of rails to the Bethlehem Steel Co. and the United States Steel Products Co., and the final award, which calls for 110 to 130-lb. T and girder rails, was as follows: 38,563 tons to the United States Steel Products Co., 38,664 tons to the Bethlehem Steel Co. and 17,640 tons to the Colorado Fuel & Iron Co. The Southern Pacific Co. has come into the market and will open bids on Dec. 26 for 28,000 kegs of track spikes, 3200 kegs of track bolts and 1,000,000 tie plates.

Birmingham

Pig Iron Producers Have Accumulated Sizable Backlogs

BIRMINGHAM, Dec. 27.—Pig iron producers of this district have accumulated a sizable tonnage for the first quarter. Some of it will be a carryover from December, and some represents first quarter sales. Buying was steady during the first three weeks of the month. A holiday lull has now set in. Shipments have declined, and the market is temporarily quiet. Up to Dec. 15, however, shipments of the three merchant producers were approximately equal to production. Quotations continue on a $16 base both for this month and the first quarter. In the past week numerous inquiries for first quarter appeared.

Prices per gross ton, f.o.b. Birmingham district furnaces:

No. 2 foundry, 1.75 to 2.25 sil.	$16.00
No. 1 foundry, 2.25 to 2.75 sil.	16.50
Basic	16.00

Finished Steel.—Buying continued favorable until the holidays. There was the usual hold-up of new tonnage and inquiries last week. Prices remain unchanged.

Cast Iron Pipe.—The market is quiet, and there has been very little buying within the past week. A good tonnage is in prospect for the early part of 1928.

Coke.—Foundry coke business has slackened for the holidays. Domestic coke is moving freely on account of cold weather.

Old Material.—Very little demand has developed within the past week. Shipments were light. Prices are unchanged.

Prices per gross ton, delivered Birmingham district consumers' yards:

Heavy melting steel	$10.00 to $10.50
Scrap steel rails	11.00 to 11.50
Short shoveling turnings	8.00 to 8.50
Cast iron borings	8.00 to 8.50
Stove plate	13.00 to 14.00
Steel axles	19.00 to 20.00
Iron axles	18.00 to 20.00
No. 1 railroad wrought	10.00 to 11.00
Rails for rolling	12.00 to 13.00
No. 1 cast	14.50 to 15.00
Tramcar wheels	12.50 to 13.50
Cast iron carwheels	12.00 to 13.00
Cast iron borings, chemical	13.50 to 14.00

St. Louis

Missouri-Kansas-Texas Buys 6250 Tons of Rails—Scrap Advances

ST. LOUIS, Dec. 27.—The usual holiday lull exists in the pig iron trade. The Granite City maker during the week sold about 4000 tons, made up of various lots of both foundry and malleable iron ranging from a carload up to 1100 tons. A leading Southern maker sold about 700 tons for prompt shipment. An early pick-up of business is expected after the first of the year, especially in view of the low stocks of iron in the hands of melters. Prices are unchanged.

Prices per gross ton at St. Louis:

No. 2 fdy., sil. 1.75 to 2.25 f.o.b. Granite City, Ill.	$19.50 to $20.00
Northern No. 2 fdy., delivered St. Louis	20.66
Southern No. 2 fdy., delivered	20.42
Northern malleable, delivered	20.66
Northern basic, delivered	20.66

Freight rates: 81c. from Granite City to St. Louis; $2.16 from Chicago; $4.42 from Birmingham.

Old Material.—The market has made further gains, dealers' prices having advanced 50c. to $1.50 a ton. All rolling mill grades are especially strong, as are melting rails. There have been some sales to consumers of rails for rolling and melting, mills having taken all that dealers would sell them at present prices. Dealers believe that the market will advance further and are buying with the intention, they say, of laying the material down if the consumers will not pay a "fair" price for it. Railroad lists include: Union Pacific, 2000 tons; Missouri Pacific, 1000 tons; Mobile & Ohio, Cotton Belt and Nickel Plate, each 500 tons, and St. Louis-San Francisco seven carloads.

Prices per gross ton f.o.b. dealers' yards and delivered St. Louis district consumers' works:

Heavy melting steel	$12.00 to $12.50
No. 1 locomotive tires	14.00 to 14.25
Heavy shoveling steel	12.00 to 12.50
Miscellaneous standard-section rails, including frogs, switches and guards, cut apart	14.00 to 14.50
Railroad springs	15.00 to 15.50
Bundled sheets	9.00 to 9.50
No. 2 railroad wrought	12.00 to 12.50
No. 1 busheling	10.50 to 11.00
Cast iron borings	9.50 to 10.00
Iron rails	13.50 to 14.00
Rails for rolling	15.50 to 16.00
Machine shop turnings	7.00 to 7.50
Steel car axles	19.50 to 20.00
Iron car axles	23.50 to 24.00
Wrought iron bars and transoms	20.50 to 21.00
No. 1 railroad wrought	11.50 to 12.00
Steel rails, less than 3 ft	15.50 to 16.00
Steen angle bars	12.25 to 12.75
Cast iron carwheels	14.00 to 14.50
No. 1 machinery cast	15.25 to 15.75
Railroad malleable	11.50 to 12.00
No. 1 railroad cast	13.50 to 14.00
Agricultural malleable	11.50 to 12.00
Relaying rails, 60 lb. and under	20.50 to 23.50
Relaying rails, 70 lb. and over	26.50 to 29.00

Rails and Track Supplies.—The Missouri-Kansas-Texas Railroad has purchased 6250 tons of 90-lb. rails, having distributed the business among the Bethlehem Steel Co., the Illinois Steel Co. and the Inland Steel Co. The St. Louis Southwestern Railway has issued an inquiry for 15,000 tons of 85-lb. rails and the necessary quantities of bolts, spikes and angle bars.

Finished Steel.—Specifications for plates, shapes and bars on contracts that extend into 1928 have been on a freer basis in the last few weeks, but new contracts are coming in rather slowly. Building construction continues light, and fabricators of structural steel have been forced to curtail operations. Warehouse business is experiencing the usual holiday lull.

Coke.—Domestic coke continues in good demand as a result of the cold weather. Buying of foundry grades is very light, and no improvement is expected until after the first of the year.

Warehouse Prices, f.o.b. St. Louis

	Base per Lb.
Plates and structural shapes	3.25c.
Bars, soft steel or iron	3.15c.
Cold-finished rounds, shafting and screw stock	3.75c.
Black sheets (No. 24)	4.80c.
Galvanized sheets (No. 24)	5.35c.
Blue annealed sheets (No. 10)	3.60c.
Black corrugated sheets	4.65c.
Galvanized corrugated sheets	5.30c.
Structural rivets	3.60c.
Boiler rivets	3.80c.
	Per Cent Off List
Tank rivets, ⅞-in. and smaller	70
Machine bolts	60
Carriage bolts	60
Lag screws	60
Hot-pressed nuts, square, blank or tapped	60
Hot-pressed nuts, hexagons, blank or tapped	60

Canada

Better Pig Iron Contracting—Undercurrent of Weakness in Scrap

TORONTO, ONT., Dec. 27.—Following the precedent of the past two years, interest in the Canadian pig-iron market is becoming more active as the year draws to a close. In this connection several large first quarter contracts have been booked, and recent inquiries indicate that other melters are preparing to make known their requirements within a few days. Spot sales for the week were confined to orders ranging from one to two cars. New price developments are lacking, and local interests do not look for further changes until after the turn of the year.

Prices per gross ton:

Delivered Toronto	
No. 1 foundry, sil. 2.25 to 2.75	$23.60
No. 2 foundry, sil. 1.75 to 2.25	23.60
Malleable	23.60
Delivered Montreal	
No. 1 foundry, sil. 2.25 to 2.75	25.00
No. 2 foundry, sil. 1.75 to 2.25	25.00
Malleable	25.00
Basic	24.00
Imported Iron at Montreal Warehouse	
Summerlee	33.50
Carron	33.00

Old Material.—Inquiry is better in connection with advance buying, and a few contracts have been closed for first quarter. Most consumers, however, are delaying as long as possible in making known their requirements for next year, and none is in a hurry to place large-tonnage orders. Several fair tonnage orders, however, were closed during the week for immediate delivery. Scrap accumulations in the Hamilton, Ont., district are having an adverse effect on the Ontario scrap market, and until these have been materially reduced local dealers do not look for an active buying movement from that section. In the Montreal district, dealers report a better demand on export account, although sales are still much below those of three or four months ago. Inquiries are better, indicating an improvement in export business early in the new year. While prices remain unchanged there is still an undercurrent of weakness, which is likely to result in lower prices in the early future.

Dealers' buying prices:

	Per Gross Ton	
	Toronto	Montreal
Heavy melting steel	$9.00	$8.00
Rails, scrap	10.00	10.00
No. 1 wrought	9.00	11.00
Machine shop turnings	7.00	6.00
Boiler plate	7.00	7.00
Heavy axle turnings	7.50	7.50
Cast borings	7.50	6.00
Steel turnings	7.00	6.50
Wrought pipe	5.00	6.00
Steel axles	14.00	19.00
Axles, wrought iron	16.00	21.00
No. 1 machinery cast	....	16.00
Stove plate	....	12.00
Standard carwheels	....	14.50
Malleable	....	13.00
	Per Net Ton	
No. 1 machinery cast	15.00	....
Stove plate	9.00	....
Standard carwheels	13.00	....
Malleable scrap	13.00	....

New By-Product Plant in Minnesota

The Zenith Furnace Co., West Duluth, Minn., has awarded a contract to the Koppers Construction Co., Pittsburgh, for the erection of a by-product coke plant. This plant will consist of 41 Becker-type ovens and by-product plant, and will have an annual carbonizing capacity of 350,000 tons of coal. These ovens will have the feature common to all Becker-type ovens, of being able to be heated with blast furnace gas or producer gas, as well as with coke oven gas.

Buffalo

Pig Iron Demand Sustained—Inquiry for 1500 Tons of Concrete Bars

BUFFALO, Dec. 27.—In the pig iron market there is a good sprinkling of inquiries and orders in spite of the holiday lull. Several Buffalo district melters are in the market for between 500 and 1000 tons. Most of this iron is foundry, though one inquiry is for 1000 tons of malleable. Among orders placed last week was one for 1000 tons of malleable, another for 500 tons of foundry, and one for Syracuse delivery calling for 1000 tons of foundry and malleable. Prices in this district are firm at $17, base furnace, for foundry grade. A locomotive plant has come into the market for 300 tons, following an extended period in which it did no buying. The Bethlehem Steel Co. has banked a furnace at its Lackawanna plant, one Donner stack is down for a 10-day period for repairs, and there is a possibility that the Hanna Furnace Co. will bank one of its four active stacks.

Prices per gross ton, f.o.b. furnace:

No. 2 plain fdy., sil. 1.75 to 2.25	$17.00
No. 2X foundry, sil. 2.25 to 2.75	17.50
No. 1X foundry, sil. 2.75 to 3.25	18.50
Malleable, sil. up to 2.25	17.50
Basic	17.00
Lake Superior charcoal	27.28

Old Material.—There is almost a complete tie-up of shipments to mills in this district because of inventory-taking. One large mill is the exception. The others have requested dealers not to ship until after the first of the year. Dealers do not look for good business for some time. Mills generally are covered for their requirements until well after the first of next month, and some of them have orders that will take care of them till March 1. Consumption the latter part of this month has not been heavy. There have been a few small sales of angle bars and short rails. One of the largest local foundries is shutting down during the holiday period.

Prices per gross ton, f.o.b. Buffalo consumers' plants:

Basic Open-Hearth Grades	
No. 1 heavy melting steel	$14.50 to $15.00
No. 2 heavy melting steel	13.75 to 14.25
Scrap rails	13.75 to 14.25
Hydraulic compressed sheets	11.50 to 12.00
Hand bundled sheets	8.50 to 9.00
Drop forge flashings	11.50 to 12.00
No. 1 busheling	13.25 to 13.50
Heavy steel axle turnings	12.75 to 13.25
Machine shop turnings	9.00 to 9.25
Acid Open-Hearth Grades	
Railroad knuckles and couplers	15.50 to 15.75
Railroad coil and leaf springs	16.00 to 16.50
Rolled steel wheels	14.75 to 15.25
Low phosphorus billet and bloom ends	15.75 to 16.00
Electric Furnace Grades	
Heavy steel axle turnings	12.75 to 13.25
Short shoveling steel turnings	10.75 to 11.00
Blast Furnace Grades	
Short shoveling steel turnings	10.75 to 11.00
Short mixed borings and turnings	9.75 to 10.00
Cast iron borings	10.00 to 10.50
No. 2 busheling	9.00 to 9.50
Rolling Mill Grades	
Steel car axles	16.00 to 16.50
No. 1 railroad wrought	12.00 to 12.50
Cupola Grades	
No. 1 machinery cast	14.50 to 15.00
Stove plate	12.75 to 13.00
Locomotive grate bars	10.50 to 11.00
Steel rails, 3 ft. and under	16.00 to 16.50
Cast iron carwheels	14.00 to 14.50
Malleable Grades	
Railroad	15.00 to 15.50
Agricultural	15.00 to 15.50
Industrial	15.00 to 15.50

Finished Steel.—Inquiry for bars and shapes continues active, and specifications against old orders are fair. Makers look for a real pick-up in buying soon. The automobile business continues to improve, and inquiry is better for all kinds of steel used in that industry. Sheet demand has improved. Reinforcing bar makers are interested in the award of the general contract for the erection of a large flour mill and elevator in Buffalo by the Hecker-Jones-Jewell Co. This structure, bids for which are being called for Dec. 28, will require 1500 tons of reinforcing bars.

Warehouse Prices, f.o.b. Buffalo

	Base per Lb.
Plates and structural shapes	3.40c.
Soft steel bars	3.30c.
Reinforcing bars	2.75c.
Cold-finished flats, squares and hexagons	4.45c.
Rounds	3.95c.
Cold rolled strip steel	5.85c.
Black sheets (No. 24)	4.30c.
Galvanized sheets (No. 24)	5.15c.
Blue annealed sheets (No. 10)	3.80c.
Common wire nails, base per keg	$3.65
Black wire, base per 100 lb	3.90

Cincinnati

Steel Specifications Show Sharp Gain—Shading on Nails

CINCINNATI, Dec. 27.—The pig iron market is characterized by dullness incident to the holiday season. No major transactions were reported during the past week, and new inquiries are for small lots, ranging from 300 tons down to single carloads. An increase in buying is not expected for at least 10 days. The price situation is virtually unchanged, with northern Ohio makers asking $16.50, base furnace, and producers in Ironton district quoting $19, base furnace. In the South both Alabama and Tennessee interests are selling iron at $16, base Birmingham. Jackson County silvery furnaces are firm at $25, base Jackson, for 8 per cent, but are booking only unimportant tonnages. The inquiry from the Buick Motor Co. for from 1500 to 2500 tons of 14 to 16 per cent ferrosilicon is still pending and probably will be closed this week.

Prices per gross ton, delivered Cincinnati:

So. Ohio fdy., sil. 1.75 to 2.25	$20.89
So. Ohio malleable	$20.14 to 20.89
Alabama fdy., sil. 1.75 to 2.25	19.69
Alabama fdy., sil. 2.25 to 2.75	20.19
Tennessee fdy., sil. 1.75 to 2.25	19.69
Southern Ohio silvery, 8 per cent	26.89

Freight rates, $1.89 from Ironton and Jackson, Ohio; $3.69 from Birmingham.

Finished Material.—Specifications and orders in the past week have been in good volume, and indications are that bookings this month will show an increase of from 75 to 100 per cent over November. The fact that the betterment is reflected in almost all consuming industries lends encouragement to producers, who now look for a gradual upward swing in business during the early months of 1928. Jobbers have been among the buyers of heavy steel products and of sheets. Their stocks are fairly well depleted, and they are ordering additional material in anticipation of an improvement in sales during January. In structural steel, activities have declined considerably. Awards have been few, and no new projects of importance have been announced since Dec. 1. Fabricating shops are operating at a curtailed rate. The Carnegie Steel Co. is low bidder on 1500 tons of steel piling for Ohio River dam No. 53. Bars, shapes and plates remain on the basis of 1.80c., Pittsburgh, on sizable tonnages, and 1.90c., for small lots. The sheet market has shown signs of greater stability, although irregularities in prices have not entirely disappeared. Mills report that they are quoting 2.10c., base Pittsburgh, on blue annealed, 2.90c. on black and 3.75c. on galvanized, but this schedule has

Warehouse Prices, f.o.b. Cincinnati

	Base per Lb.
Plates and structural shapes	3.40c.
Bars, soft steel or iron	3.30c.
Reinforcing bars	3.30c.
Hoops	4.00c. to 4.25c.
Bands	3.95c.
Cold-finished rounds and hexagons	3.85c.
Squares	4.35c.
Open-hearth spring steel	4.75c. to 5.00c.
Black sheets (No. 24)	4.05c.
Galvanized sheets (No. 24)	4.90c.
Blue annealed sheets (No. 10)	3.60c.
Structural rivets	3.85c.
Small rivets	65 per cent off list
No. 9 annealed wire, per 100 lb	$3.00
Common wire nails, base per keg	2.95
Cement coated nails, base 100 lb. keg	2.95
Chain, per 100 lb	7.55
	Net per 100 Ft.
Lap-welded steel boiler tubes, 2-in.	$18.00
4-in.	38.00
Seamless steel boiler tubes, 2-in.	19.00
4-in.	39.00

not yet been subjected to a real test, practically all consumers having been protected at lower prices. The automobile industry is placing orders for sheets at a fair rate, while electrical manufacturers have been rather steady purchasers during the past two months. Operations of sheet companies in this district have increased, and further expansion is anticipated shortly. Sales of wire goods have been only fair at best, and prices under $2.50 per keg, base Ironton, on nails, are said to have been named by one or two producers.

Reinforcing Bars.—The Pollak Steel Co. will supply 250 tons of rail steel bars for the new building of the Young Women's Christian Association in this city and 200 tons for the Purcell High School, Cincinnati. An award of 3700 tons for the Eighth Street viaduct in Cincinnati probably will not be made until after Jan. 1. New billet bars are quoted at 1.85c., base Pittsburgh, and rail steel stock at 1.75c., base mill.

Warehouse Business.—Orders in the past week were exceptionally light in volume, and bookings in December are expected to be the smallest of any month in the year. Aside from concessions in common wire nails, which are selling at $2.85 to $2.95 per keg, prices are firm and unchanged.

Coke.—With the Christmas holidays and the inventory period at hand, by-product foundry coke specifications again have fallen off, although shipments for the month of December will be greater than those in November. An important dealer states that bookings of by-product domestic coke this month have been satisfactory, but others express disappointment at the absence of heavier buying. The movement of beehive foundry coke from the New River and Wise County districts to consumers in this territory has been light. The Louisville & Nashville is in the market for 525 tons of beehive or by-product foundry coke for first quarter delivery, while the Newport Rolling Mill Co. is inquiring for 200 tons of 48-hr. furnace coke.

Foundry coke prices per net ton, delivered Cincinnati: By-product coke, $9.52 to $9.64; Wise County coke, $7.59 to $8.09; New River coke, $10.09 to $10.59. Freight rates: $2.14 from Ashland, Ky.; $2.59 from Wise County and New River ovens.

Old Material.—While steel plants are refusing to buy for forward delivery and, in some cases, have asked for temporary suspension of shipments on contract, the sentiment among dealers continues to be optimistic. That mills will make purchases before the end of January is the prevailing opinion. Meanwhile prices recently established are well supported by dealers. The Big Four is reported to be ready to issue a large list.

Dealers' buying prices per gross ton f.o.b. cars, Cincinnati:

Heavy melting steel	$11.50 to $12.00
Scrap rails for melting	11.75 to 12.25
Loose sheet clippings	8.75 to 9.25
Bundled sheets	9.50 to 10.00
Cast iron borings	8.50 to 9.00
Machine shop turnings	8.00 to 8.50
No. 1 busheling	10.50 to 11.00
No. 2 busheling	7.50 to 8.00
Rails for rolling	13.00 to 13.50
No. 1 locomotive tires	13.50 to 14.00
No. 1 railroad wrought	11.00 to 11.50
Short rails	17.00 to 17.50
Cast iron carwheels	12.75 to 13.25
No. 1 machinery cast	16.00 to 17.00
No. 1 railroad cast	13.50 to 14.00
Burnt cast	8.00 to 8.50
Stove plate	9.25 to 9.75
Brake shoes	10.00 to 10.75
Railroad malleable	12.50 to 13.00
Agricultural malleable	12.00 to 12.50

More Foreign Foundries Use Pearlitic Iron Process

HAMBURG, GERMANY, Dec. 10.—The production of pearlitic iron castings is rapidly increasing among German and other European foundries. Within the past year the greater number of German foundries have adopted this process and in Great Britain, by the end of October, licenses had been secured by 19 foundries. Pearlitic iron was being made in France, Italy and Denmark last year and this year foundries in Brazil, Czechoslovakia, Belgium, Austria and Japan purchased licenses for this process. The many tests, which have been made, particularly in the United States, have satisfied most foundrymen that the quality is unchanging and the tensile strength and other properties closely approach some grades of steel.

Gain in Steel Output and Decline in Pig Iron Production in Canada

TORONTO, ONT., Dec. 27.—The production of pig iron in Canada during the month of November amounted to 37,989 gross tons, which was a slight decline from the output of 38,097 tons in October, but was 27 per cent under the 52,345 tons produced in November, 1926. Compared with the previous month, reports for November showed that the output of basic iron increased to 35,538 tons from 30,356 tons in October, and the production of foundry iron declined to 2451 tons from 7741 tons in the previous month. No malleable iron was made in either of the two months. During the month under review one additional blast furnace was blown in at Sydney, N. S., resulting in four furnaces being in blast on Nov. 30, compared with three at the close of the previous month. The active furnaces had a capacity of 1375 gross tons per day, or about 27 per cent of the total capacity of all blast furnaces in the Dominion, and were located at the following points: Dominion Iron & Steel Co., Sydney, N. S., two; Algoma Steel Corporation, Sault Ste. Marie, Ont., one; Steel Co. of Canada, Ltd., Hamilton, Ont., one. The Algoma Steel Corporation blew in a second blast furnace Dec. 2, so that at the present time five furnaces are blowing out of a total of 18 in Canada.

For the 11 months ended with November, the production of pig iron in Canada totaled 646,500 gross tons, a decline of 5 per cent from the 683,532 tons reported for the corresponding 11 months of 1926.

The production of ferroalloys during November was slightly lower, at 4512 tons, and was about evenly divided between the grade having a high manganese content and the grade running from 15 to 50 per cent silicon. In October the output of ferroalloys was 4815 tons.

Production of steel ingots and castings during November amounted to 80,730 gross tons, an increase of 43 per cent over the 56,371 tons of October and 49 per cent over the 54,311 tons produced in November, 1926. The increase in November was due largely to a greater output of steel ingots, which increased to 78,436 tons from 54,190 tons in October.

For the 11 months of the year ended with November the production of steel ingots and castings totaled 811,390 gross tons, which was 13 per cent greater than the 718,395 tons for the corresponding period of 1926. This year's output included 774,124 tons of steel ingots and 37,266 tons of direct steel castings.

While Canadian pig iron prices remained unchanged during the month, the Dominion Bureau of Statistics index number for iron and steel and its products (1913 prices equal 100) was 141.4, as compared with 142.2 in October. Slight declines in the prices of tin plate, steel bars and wire were responsible for the downward movement of the index.

Detroit Scrap Mart Stronger—Production Foundries Run Full

DETROIT, Dec. 27.—The scrap market is showing very firm tendencies, although no sales of large tonnages have been made in this district. The pig iron market is firm, with most melters covered for the first quarter, and shipments for January promise to be heavy. Many of the production shops are running full time during the holidays, which is a reflection of increased automobile output. Scrap prices are unchanged.

Dealers' buying prices per gross ton, f.o.b. cars, Detroit:

Heavy melting and shoveling steel	$11.75 to $12.25
Borings and short turnings	8.75 to 9.25
Long turnings	7.50 to 8.00
No. 1 machinery cast	16.00 to 17.00
Automobile cast	18.00 to 19.00
Hydraulic compressed sheets	10.25 to 10.75
Stove plate	11.50 to 12.50
No. 1 busheling	9.00 to 9.50
Sheet clippings	7.50 to 8.00
Flashings	9.75 to 10.25

NON-FERROUS METAL MARKETS

The Week's Prices

Cents per Pound for Early Delivery

	Dec. 27	Dec. 23	Dec. 22	Dec. 21
Lake copper, N. Y.	14.25	14.25	14.25	14.25
Electrolytic copper, N. Y.*	13.75	13.75	13.75	13.75
Straits tin, spot, N. Y.	58.25	58.37½	58.37½	58.37½
Lead, New York	6.50	6.50	6.50	6.50
Lead, St. Louis	6.30	6.30	6.30	6.30
Zinc, New York	6.00	6.00	6.00	6.00
Zinc, St. Louis	5.65	5.65	5.65	5.65

*Refinery quotation; delivered price ¼c. higher.

NEW YORK, Dec. 27.—Very little activity is reported in any of the markets. Copper continues firm, but very quiet and the tin market is duller than at any time this year. Lead is inactive but firm. The zinc market continues to weaken. As the year closes the expectation persists that, early in 1928, active and stronger markets are in store.

Copper.—Just before Christmas considerable activity by foreign buyers enlivened the market, but domestic consumers remained indifferent. The quotation of Copper Exporters, Inc., stands unchanged at 13.50c., c.i.f. European ports. Domestic prices are also unchanged at 14c., delivered in the Connecticut Valley. Several producers are asking 14.25c., delivered, but the light demand is being met at the lower level. In general, the market is quiet, but decidedly firm with sellers in an excellent position. Not much activity is expected until after the turn of the year. With consumers not covered far ahead, prospects for higher prices and an active market are believed to be well founded. Lake copper is quoted at 14.25c., delivered.

Tin.—The week ended with Saturday, Dec. 24, is described as the quietest one of the year. Not more than 300 tons changed hands and 200 tons of this was sold on one day. Buyers are evidently waiting for a slump in prices between now and the first of the year and, if one develops, considerable buying is looked for. At present there is no interest in prices and both consumers and dealers are watching the trend. The market today was decidedly inactive, due both to the holiday season here, but more especially to the fact that London is closed today because of the "boxing holiday." Spot Straits tin today is quoted at 58.25c., New York, with sales at a minimum. Arrivals thus far this month have been 2955 tons with 5280 tons reported afloat.

Lead.—Inquiry from consumers has been very light the last week and prices have remained unchanged. The leading interest continues to quote 6.50c., New York, as the contract price and the market at St. Louis stands at 6.30c. Producers are reported as well booked. According to the data of the American Bureau of Metal Statistics, world production for 1927 will probably have increased a little more than 4 per cent over 1926.

Zinc.—Prices for prime Western have eased a little more and stand at 5.65c., St. Louis, or 6c., New York. Demand is naturally light, but a better market is expected early in January. Quotations stand almost at the low point of the year which was 5.60c., St. Louis, a few weeks ago. Ore prices fell $1 last week to $35 per ton, Joplin. Production was about 11,000 tons and sales were close to 6000 tons.

Nickel.—Wholesale lots of ingot nickel are quoted unchanged at 35c., with shot nickel at 36c. and electrolytic nickel at 39c. per lb.

Antimony.—Private advices are to the effect that production in China is being curtailed at least 50 per cent. While prices are practically unchanged at 11c. for spot delivery and 11.25c. for futures, New York, duty paid, the tone is considerably firmer, due to conditions in China and to the fact that demand for batteries by the Ford Motor Co. will soon be decidedly increased.

Aluminum.—Virgin metal, 98 to 99 per cent pure, is quoted at 24.30c., delivered.

Non-Ferrous Metals at Chicago

DEC. 27.—Sales are small and quotations on lead and zinc are lower. Prices for copper and tin are steady. The old metal market is quiet and prices are soft.

Prices, per lb., in carload lots: Lake copper,

Metals from New York Warehouse

Delivered Prices Per Lb.

Tin, Straits pig	60.75c. to 61.00c.
Tin, bar	62.75c. to 63.25c.
Copper, Lake	15.25c.
Copper, electrolytic	15.00c.
Copper, casting	14.25c.
Zinc, slab	7.75c. to 8.75c.
Lead, American pig	7.65c. to 8.65c.
Lead, bar	9.90c. to 10.90c.
Antimony, Asiatic	13.00c. to 13.50c.
Aluminum No. 1 ingot for remelting (guaranteed over 99 per cent pure)	27.00c. to 28.00c.
Aluminum ingots, No. 12 alloy	26.00c. to 27.00c.
Babbitt metal, commercial grade	30.00c. to 40.00c.
Solder, ½ and ½	39.25c. to 40.25c.

Metals from Cleveland Warehouse

Delivered Prices Per Lb.

Tin, Straits pig	64.75c.
Tin, bar	66.75c.
Copper, Lake	15.25c.
Copper, electrolytic	15.25c.
Copper, casting	14.50c.
Zinc, slab	7.75c.
Lead, American pig	7.25c.
Antimony, Asiatic	16.00c.
Lead, bar	9.50c.
Babbitt metal, medium grade	19.75c.
Babbitt metal, high grade	67.75c.
Solder, ½ and ½	38.25c.

Rolled Metals from New York or Cleveland Warehouse

Delivered Prices, Base Per Lb.

Sheets—	
High brass	18.50c. to 19.25c.
Copper, hot rolled	22.75c. to 23.75c.
Copper, cold rolled, 14 oz. and heavier	25.25c. to 26.25c.
Seamless Tubes—	
Brass	23.37½c. to 24.37½c.
Copper	24.50c. to 25.50c.
Brazed Brass Tubes	26.50c. to 27.50c.
Brass Rods	16.25c. to 17.25c.

From New York Warehouse

Delivered Prices, Base Per Lb.

Zinc sheets (No. 9), casks	10.50c. to 11.00c.
Zinc sheets, open	11.00c. to 11.25c.

Non-Ferrous Rolled Products

Mill prices on bronze, brass and copper products have not changed since Dec. 2. Lead full sheets are holding at the advance of Dec. 1, and the price of zinc sheets has not changed since Aug. 5.

List Prices, Per Lb., f.o.b. Mill

On Copper and Brass Products, Freight up to 75c. per 100 Lb. Allowed on Shipments of 500 Lb. or Over

Sheets—	
High brass	18.75c.
Copper, hot rolled	22.75c.
Zinc	10.00c.
Lead (full sheets)	10.00c. to 10.25c.
Seamless Tubes—	
High brass	23.62½c.
Copper	24.50c.
Rods—	
High brass	16.50c.
Naval brass	19.25c.
Wire—	
Copper	15.75c.
High brass	19.25c.
Copper in Rolls	21.75c.
Brazed Brass Tubing	26.75c.

Aluminum Products in Ton Lots

The carload freight rate is allowed to destinations east of Mississippi River and also allowed to St. Louis on shipments to destinations west of that river.

Sheets, 0 to 10 gage, 3 to 30 in. wide	33.00c.
Tubes, base	42.00c.
Machine rods	34.00c.

Rolled Metals, f.o.b. Chicago Warehouse

(Prices Cover Trucking to Customers' Doors in City Limits)

	Base per Lb.
Sheets—	
High brass	18.75c.
Copper, hot rolled	22.75c.
Copper, cold rolled, 14 oz. and heavier	25.00c.
Zinc	11.00c.
Lead, wide	9.75c.
Seamless Tubes—	
Brass	25.12½c.
Copper	26.00c.
Brazed Brass Tubes	26.75c.
Brass Rods	16.50c.

14.25c.; tin, 59.75c.; lead, 6.35c.; zinc, 5.75c.; in less-than-carload lots, antimony, 13c. On old metals we quote copper wire, crucible shapes and copper clips, 10c.; copper bottoms, 9c.; red brass, 9c.; yellow brass, 6.75c.; lead pipe, 5c.; zinc, 3.50c.; pewter, No. 1, 34c.; tin foil, 43.50c.; block tin, 52c.; aluminum, 12.50c.; all being dealers' prices for less-than-carload lots.

RAILROAD EQUIPMENT

Four Roads Order a Total of 11,550 Freight Cars—4000 Inquired For

One of the most important weeks of the year in railroad equipment buying brought orders for a total of 11,550 freight cars from four roads and inquiries for 4000 cars. The Southern bought 4750, the Santa Fe 3650, the Louisville & Nashville 2150 and the Chicago & North Western 1000. The St. Louis-San Francisco inquired for 4000. Details of the week's business follow:

The St. Louis-San Francisco will buy 500 55-ton flat cars, 500 automobile cars, 1500 hopper cars and 1500 box cars.

The Santa Fe has ordered 76 miscellaneous passenger cars from the Pullman Car & Mfg. Corporation.

Southern Railway System has placed orders for 4750 freight cars and 25 baggage-mail cars distributed as follows: 2000 hopper cars, with Standard Steel Car Co.; 1750 automobile cars, with American Car & Foundry Co.; 250 ballast cars, with Rodger Ballast Car Co.; 750 hopper cars, with Mount Vernon Car Mfg. Co.; 16 mail-baggage cars with 30-ft. mail compartments, 7 mail-baggage cars with 15-ft. mail compartments and two postal cars, with Bethlehem Steel Co.

Atchison, Topeka & Santa Fe has made the following distribution of its orders for 3650 freight cars: 500 box and 500 refrigerator cars, to Pullman Car & Mfg. Corporation; 500 gondola and 300 flat cars, to American Car & Foundry Co.; 100 ballast cars, to Rodger Ballast Car Co.; 500 box cars, to Mount Vernon Car Mfg. Co.; 500 automobile cars, to General American Car Corporation; 500 single-deck and 250 double-deck stock cars, to Pennsylvania Tank Car Co. Remaining on inquiry are 100 air-dump and 100 caboose cars.

Louisville & Nashville has ordered 2150 freight cars and 16 passenger and baggage cars which were placed as follows: 1250 gondolas, with Pressed Steel Car Co.; 200 automobile, 200 low-side 70-ton gondola, 200 stock and 300 box cars, with Mount Vernon Car Mfg. Co.; two 70-ft. steel baggage cars, two 70-ft. combination passenger-baggage, four 61-ft. combination passenger-baggage, four 70-ft. middle smoking room and four 70-ft. steel coaches, with American Car & Foundry Co.

Chicago & North Western has ordered 500 70-ton hopper cars from Pullman Car & Mfg. Corporation and 500 flat cars from American Car & Foundry Co.

Pacific Fruit Express is preparing to inquire for 2000 refrigerator cars.

Northern Pacific has made inquiry for 50 caboose car underframes.

Gulf, Mobile & Northern has purchased 12 30-yd., center-hinge air-dump cars from Koppel Industrial Car & Equipment Co.

New York, Westchester & Boston has ordered 10 motor passenger train cars from Osgood Bradley Car Co.

Chicago & Eastern Illinois has placed an order for two combination mail and smoking cars with Pullman Car & Mfg. Corporation.

Old Metals, Per Lb., New York

The buying prices represent what large dealers are paying for miscellaneous lots from the smaller accumulators and the selling prices are those charged consumers after the metal has been properly prepared for their use.

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, heavy crucible	12.00c.	13.50c.
Copper, heavy and wire	11.50c.	12.875c.
Copper, light and bottoms	9.75c.	11.00c.
Brass, heavy	7.00c.	8.50c.
Brass, light	6.00c.	7.50c.
Heavy machine composition	9.50c.	10.75c.
No. 1 yellow brass turnings	7.75c.	8.75c.
No. 1 red brass or composition turnings	8.75c.	9.75c.
Lead, heavy	5.25c.	5.625c.
Lead, tea	4.25c.	4.75c.
Zinc	3.75c.	4.25c.
Sheet aluminum	12.75c.	14.50c.
Cast aluminum	12.75c.	14.50c.

Pennsylvania Railroad has purchased six double power plant, 73-ft., gas-electric rail motor cars from J. G. Brill Co.

United Fruit Co. is inquiring for 15 20-ton flat cars.

Texas Co. is making inquiry for 300 10,000-gal., 50-ton insulated tank cars.

Maryland Slag Co. has ordered two extension side dump cars from Clark Car Co. This company has also taken orders for two extension side dump cars from Timken Roller Bearing Co. and for four similar cars from Lehigh Coal & Navigation Co.

The Warner-Quinlan Co. has ordered 15 insulated tank cars from American Car & Foundry Co.

J. A. Farrell Heads Steel Corporation

(*Concluded from page* 1797)

chusetts and later settled at Locust Valley, Long Island, on the estate which is now the country home of Mr. Taylor.

Graduating from Cornell University in 1894 as bachelor of laws, Mr. Taylor was admitted in the next year to the New York bar. He soon became interested in the textile business, his first organizations some twenty or twenty-five years ago including the Bay State Mills located at Lowell and Newburyport, Mass. Later he organized the Boston Yarn Co., a textile-selling unit, and through various consolidations became a factor in other important cotton textile enterprises. In 1914 Mr. Taylor and his immediate associates built or acquired control of the Passaic Cotton Mills at Passaic, N. J., the Peabody Mills at Newburyport, Mass., the Rotch Mills, the New Bedford Spinning Co. and the Penrod Mills at New Bedford, Mass., and the Sanford Spinning Mills at Fall River, Mass. These mills represented one of the largest groups in the country engaged in the manufacture of cotton fabrics. In recent years Mr. Taylor has withdrawn his active interest from these organizations, and has given his attention to other corporate affairs, being at present a director of the First National Bank and First Security Co., director of the New York Central Railroad Co. and of the Atchison, Topeka & Santa Fe Railway Co., trustee and member of finance committee, Mutual Life Insurance Co. of New York, and director of the Lehigh & Wilkes-Barre Corporation.

He is a member of the Society of Colonial Wars, Sons of the Revolution, and St. Nicholas Society, trustee of the Association for Improving the Condition of the Poor, and has memberships in a number of clubs.

The Moore Drop Forging Co., Springfield, Mass., for the year ending Oct. 31, showed a net loss of $143,721, after allowing for depreciation and other charges. In the previous year the company showed a net profit of more than $600,000, and in 1925, a profit of close to $1,050,000.

PERSONAL

John A. Bennan, who is president of the Jefferson Electric Mfg. Co., Chicago, has been elected president and general manager of the Chicago Fuse Mfg. Co., Chicago. He replaces W. W. Merrill, who has retired after 30 years as head of the company. Mr. Bennan retains his connection with the Jefferson company in his present capacity.

JOHN A. BENNAN

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William P. Hosford, controller of manufacturing for the Western Electric Co., Chicago, and George C. Pratt, its general attorney, have been elected vice-presidents of the company. T. K. Stevenson, personnel director, becomes controller of manufacturing effective Jan. 1, and will be succeeded by Frederick W. Willard. On the same date Edward J. Moriarity becomes general attorney. J. E. Otterson, vice-president and general manager of Electrical Research Products, Inc., a Western Electric subsidiary, has been made president of that company, succeeding Edgar S. Bloom, who has held that position in addition to the presidency of the parent company. Whitford Drake has been elected vice-president and a director of Electrical Research Products, Inc.

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W. S. Bidle, president of the W. S. Bidle Co., Cleveland, and well-known authority on the industrial heat treatment of steel, addressed the senior class in metallurgy at the Case School of Applied Science, Cleveland, on Dec. 23. Dr. Harry A. Schwartz, manager of research for the National Malleable & Steel Castings Co., spoke before the department of metallurgy at the Case School on Dec. 22, his subject being the "Iron-Carbon-Silicon Equilibrium Diagram and the Theory of Graphitization."

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Jerome Alexander, consulting chemist and engineer, has been added to the chemical and engineering staff of the Vanadium Corporation of America, New York. Before devoting himself to consulting work, he was actively engaged in manufacturing and business for 25 years.

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Charles H. Bromley has been made vice-president of the France Packing Co., Tacony, Pa. He will participate largely in the management of sales and the shops, devoting particular attention to research in the further adaptation of France metallic floating packing for high pressures and temperatures.

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C. R. Burt, vice-president and general manager Pratt & Whitney Co., Hartford, Conn., has been made a director of the Hartford Chamber of Commerce.

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James C. Bennett, comptroller and secretary Westinghouse Electric & Mfg. Co., recently was elected a vice-president, in general charge of the accounting and treasury departments. In length of service Mr. Bennett is one of the oldest employees in the Westinghouse electric group, having joined the Westinghouse Electric Co. in 1886, five months after its formation. He is a director of the Westinghouse Electric & Mfg. Co. and also an officer and director of a number of its subsidiary companies.

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J. L. Wiley has joined the staff of Arthur D. Little, Inc., Cambridge, Mass., chemist and engineer. He was formerly librarian and translator for the Solvay Process Co. and will do similar work in his new connection.

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C. L. O. Graul has resigned as assistant to the vice-president of the Semet-Solvay Co., New York.

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Frank D. Hoerle, identified with the sale of steel and pig iron for the past 15 years and for the last two years associated with E. Arthur Tutein, Inc., at New York, has joined the sales force of the American Steel Export Co., New York, effective Jan. 1.

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Frank E. Artz has been appointed sales representative for the General Mfg. Co., Detroit, builder of flexible power presses, and will represent the company in northern Illinois, northern Indiana, Wisconsin and Iowa, with headquarters at 23 South Jefferson Street, Chicago.

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R. B. Billings was elected president and treasurer of the Utica Drop Forge Co., Utica, N. Y., at the company's annual meeting held recently. Other officers elected were J. E. O'Toole, vice-president and general sales manager, and William Armstrong, secretary and assistant treasurer.

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Charles M. Schwab, chairman Bethlehem Steel Corporation, will be guest of honor at a luncheon given by the American Arbitration Association at the Hotel Astor, New York, on Jan. 5 at 12.30 p. m. He will be one of the principal speakers.

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George P. Torrence has been appointed vice-president of the Link-Belt Co., Chicago, and will have general charge of Indianapolis operations and sales, with headquarters in the latter city. George L. Morehead has been appointed vice-president in charge of Eastern operations and sales, with headquarters at Philadelphia. Frank B. Caldwell, who has also been appointed vice-president, is in charge of the Chicago plant and sales offices tributary thereto. W. C. Carter, likewise newly elected a vice-president, is in general charge of production at all plants with headquarters at the company's general offices in Chicago.

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B. F. Jones, Jr., chairman Jones & Laughlin Steel Corporation, Pittsburgh, is reported to be improving after a severe heart attack.

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Samuel Wilson Parr, professor emeritus of industrial chemistry at the University of Illinois, has been chosen president of the American Chemical Society for 1928.

Electrochemists Fall Meeting Changed —Plans for Spring Meeting

At the spring meeting of the American Electrochemical Society to be held at Bridgeport, Conn., April 26 to 28, there will be a session on Friday morning, April 27, on industrial electric heating, held jointly with the National Electric Light Association. R. E. Talley, president and chief engineer, George J. Hagan Co., Pittsburgh, will discuss "The Application of Electric Furnaces to Heat Treatment"; R. M. Keeney, industrial heating engineer Connecticut Light & Power Co., will speak on "Electric Annealing of Non-Ferrous Metals" and John L. Christie, metallurgist Bridgeport Brass Co., will take as his subject, "Annealing with Electric Heat at the Bridgeport Brass Co."

An informal round-table discussion on "Refractories for Electric Brass Melting," with Dr. B. D. Saklatwalla, chairman, will be a feature of the luncheon, following the session on industrial electric heating.

The fall meeting of the society, instead of being held at Toronto, Canada, as previously announced, is scheduled to take place at Charleston, W. Va., Sept. 20 to 22, with headquarters at the Kanawha Hotel. The last day will be devoted to a trip to the plant of the International Nickel Co., at Huntington.

OBITUARY

CHARLES HENRY ZEHNDER, formerly president Scranton Bolt & Nut Co., Scranton, Pa., and for many years prominent in the iron and coal trade of eastern Pennsylvania, died on Dec. 26 at the Hotel Warwick, New York. He was born in Northumberland County, Pa., in 1856 and attended the Danville Academy, Danville, Pa. After having been employed for some years in the Danville National Bank, he became associated with the Jackson & Woodin Mfg. Co., Berwick, Pa., serving successively as secretary to the vice-president, superintendent, vice-president and general manager, and president. In 1896 he became president of the Dickson Mfg. Co., Scranton, Pa. In 1902 he was made president of the Alleghany Ore & Iron Co., Buena Vista, Va. He was also vice-president and a director of the Empire Steel Co. and a director of the Crane Iron Works, Catasauqua, Pa., and of the Warren Foundry & Pipe Co. and the Replogle Steel Co., Wharton, N. J. He was a member of the American Society of Mining and Metallurgical Engineers, the American Society of Mechanical Engineers, the American Iron and Steel Institute, the Franklin Institute, Philadelphia, and of a number of social organizations.

C. H. ZEHNDER

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J. WALTER DICKSON, president J. W. Dickson & Co., Pittsburgh, brokers in steel industry raw materials, died at his home in that city Dec. 20, following a short illness. He was identified for many years with E. W. Mudge & Co., Pittsburgh, severing that connection shortly after the termination of the war to become vice-president and Pittsburgh district sales manager of Park & Williams, Inc., Philadelphia. He organized his own company in 1921.

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WILLIAM GOODMAN EATON, partner in Eaton, Rhodes & Co., Cincinnati, distributers of pig iron, coal and coke, was stricken with heart disease as he was leaving his office on Dec. 21 and died shortly after at Christ Hospital. He was 56 years of age and had been prominently identified with the pig iron and coke industries in southern Ohio for more than 20 years. He was born at Yonkers, N. Y., but removed to Cincinnati during his boyhood, and was graduated from Hughes High School, later attending the University of Cincinnati. For a short time he was connected with the American Book Co., Cincinnati, which he left to become a salesman with Hickman, Williams & Co., in their Cincinnati office. In 1907 he and Frank Rhodes formed a partnership in Eaton, Rhodes & Co., dealing in pig iron, coal and coke. Mr. Eaton promoted the building of the first by-product coke ovens in the southern Ohio district, the Kentucky Solvay Coke Co., Ashland, Ky. These ovens were constructed in 1913 and for many years Mr. Eaton was associated with the management of the company, which later became the Ashland By-Product Coke Co.

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C. J. PARKER, president of the Iron Fireman Mfg. Co., the Portland Wire & Iron Works and the Grand Sheet Metal Works, all of Portland, Ore., was killed in an airplane accident near Bryan, Ohio, on Dec. 12. He was 48 years of age. T. H. Banfield, vice-president of the Iron Fireman company, was seriously injured in the accident. The men had gone East in the interest of the Iron Fireman Mfg. Co., and at the time of the accident were flying from Detroit to Fort Wayne, Ind. The pilot ran into a heavy fog and in landing in a rough field the plane was turned over.

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PETER PETTLER, president Standard Clay Products Co. and P. Pettler & Son, Beaver Falls, Pa., died on Nov. 28 at his home in that city.

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DENNIS J. CROWLEY, general superintendent Meadville Malleable Iron Co., Meadville, Pa., died Nov. 11 at his home in Rochester, N. Y., aged 67 years. He was born in Rutland, Vt., and entered the iron industry at Cleveland when he was 20 years old.

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SENTER M. JONES, first vice-president, manager of purchases and member of the executive committee of the Century Electric Co., St. Louis, died suddenly on Dec. 11, aged 47 years. He entered the organization in 1906. He was a member of the American Institute of Electrical Engineers, St. Louis Electrical Board of Trade and the St. Louis Chamber of Commerce.

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GEORGE V. SHEPARD, assistant division superintendent of the New Departure Mfg. Co., Meriden, Conn., died at his home in that city on Dec. 18, following a long illness. He was born at Hartford, Conn., 36 years ago.

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LEONARD M. NEWTON, manager of the Manchester Machine Works, Manchester, N. H., died at a hospital in that city on Dec. 21, aged 49 years.

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JOSEPH S. MITCHELL, in charge of both contracting and sales of the diamond drill department, Sullivan Machinery Co., Chicago, died suddenly on Dec. 22. He had been associated with the company for a number of years.

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EMIL POLLAK, chairman of the board and founder of the Pollak Steel Co., Cincinnati, died suddenly at his home on Dec. 24, after an illness of 10 days. He was born in Vienna, Austria, in 1846, and at the age of 19 years, came to the United States, locating in Cincinnati. In 1865 he was one of the founders of the Black Pollak Iron Co. which later became the Pollak Steel Co. Mr. Pollak was prominent in civic, charitable and educational work, and at the time of his death he was a member of the board of trustees of the University of Cincinnati and of the Hebrew Union College, Cincinnati. From 1910 to 1912 he led a successful fight in the Ohio Legislature for the reorganization of the Cincinnati Board of Education and its removal from politics. He served as a member of the board and also as a member of the Union Board of High Schools in Cincinnati. Two sons, Maurice E. and Julian A., are president and vice-president respectively of the Pollak Steel Co.

1927 Conception of Production

Industry must be tooled up fundamentally for service, and not just for the production of a certain product, according to L. J. Belnap, president Worthington Pump & Machinery Corporation, in a recent article. He said that today planning for industry must start with distribution rather than production. When a business finds what the market needs, it may then plan what, where, how, and how much to produce.

Mr. Belnap's company, after an extensive survey of the demands for its product, found that, although it had been getting more than its normal share of the business in one territory, much additional business was still available. The salesmen are now selling in terms of territorys' need for the product rather than company's need of orders. The organization has studied its manufacturing plants in relation to probable future needs of industry, and in geographical relation to markets, materials and labor. By concentrating for more economical production, it was found possible to dispense with one plant.

Training Industrial Metallurgists

(*Continued from page* 1780)

ferrous metals is accompanied by a laboratory period, in which the principles of that course are exemplified. The equipment to accomplish this work, illustrated here in part, is exceptionally good. It includes: In the foundry, a 24-in. cupola and a 14-in. cupola, and two gas-fired crucible furnaces. An electric furnace of 250 lb. of steel per hour melting capacity is being installed. In the metallurgy laboratory, nine gas-fired hearth furnaces, one 13-kw. electric furnace, and six pot furnaces, also forges, three standard methods for hardness testing, and the potentiometer system of pyrometry as accessories for the metallurgy laboratory. There is a well equipped laboratory for inspecting and photographing macroscopic and microscopic work and for making critical point determinations.

The curriculum is so arranged that the fundamentals in metallurgy and in engineering are completed before the more advanced work in either of these lines is begun. For example, physical chemistry precedes metallography and its advanced metallurgy; mechanics of materials precedes the study of the properties of carbon and alloy steel, which in turn precede senior machine design and automotive design.

During the junior year there is required a course in crystallography, which is designed to give special training in crystal study. The aim of this course is to acquaint the student with the formation of crystals and their habits. The last term of the senior year is largely devoted to technical problems which involve the solution of common metallurgy problems in the line in which the student is most interested; foundry work, industrial metallurgy or metallurgical design. During the entire senior year the student is familiar-

Graphic Temperature Records and Microscopic Work Add to the Equipment of the Student in Pursuing His Studies

Distribution of Courses in Four-Year Curriculum in Industrial Metallurgy

(Figures Represent Credit Hours)

	Freshman	Sophomore	Junior	Senior	*Total Credits	Per Cent
Chemistry:	General—4 Qualitative—4 Organic—4		Quantitative—4 Physical—4		20	9.6
Drawing and Design:	Mechanical Drawing—4 Machine Design—3	Descriptive Geometry—5		Machine Design—4	16	7.7
Physics:		Mechanics and Heat—4 Electricity and Magnetism—4 Light and Sound—4			12	5.8
Mathematics:	Algebra, Trigonometry and Analytical Geometry—12	Calculus—12			24	11.5
English:	Composition—9	Public Speaking—3		Reports (Elective)—9	12	5.8
Shop:	Pattern—2 Foundry—2 Machine—2	Pattern—2 Forge—1	Machine—3		12	5.8
Mechanics:			Mechanics—14		14	6.7
Engineering:			Engineering Laboratory—3 Thermodynamics—7 Gas Engines—2 D. C. Machines—3 A. C. Machines—4	Engineering Economics—5 Automotive Design—5 Heating and Ventilation—2	31	14.9
Crystallography:			Crystallography—4		4	1.9
Metallurgy:		Advanced Foundry—3 Manufacturing of Iron and Steel—3	Heat Treatment of Carbon Steel—3	General Metallurgy—4 Heat Treatment of Alloy Steels—3 Metallurgy and Heat Treatment of Non-Ferrous Metals and Alloys—5 Technical Problems—6	27	13.0
Metallography:				Metallography—7	7	3.4
Miscellaneous:		Physical Education—6 Military Science—3		Seminar—2 Electives—(9)	29	13.9
					208	100.0

*The college year at Michigan State College is divided into three terms. A credit comprises one hour of recitation or three hours of laboratory work for one term of 12 weeks.

Courses Required in Fifth Year in Metallurgy:

Physical Metallurgy
Crystallographic Metallurgy
Advanced Metallography
Electrochemistry
Electives
Thesis

ized with current and standard literature by attendance at seminars.

Five-Year Men in Demand

There exists an unusual demand for the man who has completed the five-year course in metallurgy. The advanced student is valuable in both industrial metallurgy and research. A year of graduate work in metallurgy is offered, also, and the facilities for such study are unusual, because the facilities and equipment of the college and the Michigan Engineering Experiment Station are available to the graduate student.

An effort is being made to have the industries cooperate with the college in the training of metallurgists. The industries are being asked to employ the metallurgy students during their vacation months in interesting, instructive and representative metallurgical work.

It is the hope of the college that such employment of students would arouse their interest in metallurgical engineering. But it would also serve to weed out the individual who has no aptitude for the work. By such cooperation we may expect the student to become interested in metallurgy before graduation and for him to indicate intelligently his desire for one kind of work or another in metallurgy.

Figuring Efficiency of Steel Mills

(*Concluded from page* 1781)

as distance per unit of time. The first mile, at 20 miles an hour, took 3 min. to traverse. The second mile took 2 min. The man traveled 2 miles in 5 min. The average speed is therefore

$$\frac{2}{5} \times 60 = 24 \text{ miles an hour.}$$

This result may be more directly obtained by the use of a mathematical device, the harmonic mean. The harmonic mean is the reciprocal of the average of the reciprocals of the items. Applying this method to the problem of the average speed we have:

$$\text{Average speed} = \frac{1}{\frac{\frac{1}{20} + \frac{1}{30}}{2}} = 2\left(\frac{1}{1/20 + 1/30}\right) = 24 \text{ miles an hr.}$$

The harmonic mean must always be used in averaging rates. Hence it must be applied to any problem of mill efficiency which involves more than one size of product, since this problem involves averaging the two rates of efficiency. In Example II, the quantities to be averaged, if we work on the basis of weight, are:

$$\frac{914{,}015}{1{,}224{,}495} \quad \text{and} \quad \frac{103{,}261}{192{,}010}$$

To get the efficiency of the run, we first compute the individual efficiencies.

E (⅝-in. rounds) = 914,015 ÷ 1,224,495 = 0.747 or 74.7 per cent.

E (⅜-in. rounds) = 103,261 ÷ 192,010 = 0.538 or 53.8 per cent.

We can then proceed to average these efficiencies as in the case of the speed problem illustrated above.

But first we must note one important factor: namely that the rolling time for ⅝-in. rounds was 1008 min., while that for the ⅜-in. rounds was only 432 min. In other words, the coefficient of efficiency of the mill for 1008 min. was 74.7 per cent while for 432 min. it was 53.8 per cent. We must make allowance for this difference in time in computing the coefficient of efficiency for the whole period. This we do by weighting the coefficients by the time during which each is held. In computing the coefficient for the period, we multiply the reciprocals of the two individual measures by the time, and multiply the whole equation by the total rolling time.

Example III.
$$E = \frac{\left(\frac{1}{1008/0.747 + 432/0.538}\right)}{1440}$$

$$E = \frac{582.73476}{542.304 + 322.704}$$

E = 67.4 per cent.

The operating efficiency of the mill is 67.4 per cent.

If, instead of pounds, we figure the efficiency in terms of lineal feet, the result would be the same, because the efficiencies for the individual sizes are the same, whether figured in terms of weight or of length. Consequently the results obtained would be unaltered.

In this illustration we have worked with actual time and actual production. It is obvious that another figure measuring efficiency might be obtained by using total time of the run, and total metal started at the roughing roll, which would include not only the actual product used above, but also cobbles, stickers, scrap and rejections. But the same formula would still have to be used; the gross figures would be substituted for those used above.

Summary

This discussion suggests a method for computing a figure expressing the operating efficiency of a rolling mill. The method is particularly adapted to the study of the performances of continuous bar mills, and rolling products up to 2 in. in diameter.

To compute the efficiency of the run, the coefficient of efficiency of the mill for each size of product is computed from the formula

Equation I.

$$E = \frac{\text{Actual Pounds Produced}}{(C\,D - 0.7071\,D) \times \pi \times S \times T \times W}$$

$C\,D$ is collar diameter of finishing roll in ft.
D is diameter of finished product in ft.
S is speed of finishing roll in r.p.m.
T is actual rolling time in min.
W is weight of finished product in lb. per ft.

If there is only one size rolled, the efficiency found according to Equation I is the efficiency for the run. If there is more than one product, the coefficients found for each separate size, in accordance with Equation I, are averaged according to the following formula:

Equation II.

$$E = \frac{(T_o + T_1 + T_2 + \ldots\ldots T_n)}{(T_o/E_o + T_1/E_1 + T_2/E_2 + \ldots\ldots + T_n/E_n}$$

$T_o, T_1, T_2 \ldots\ldots T_n$ — Actual rolling time of each separate size of product.

$E_o, E_1, E_2 \ldots\ldots E_n$ — Efficiency of mill for each size of product.

Sheet Steel Capacity of the Country

The latest directory of sheet steel manufacturers, which has been issued by the National Association of Sheet and Tin Plate Manufacturers, 420 Oliver Building, Pittsburgh, shows that there are in the United States 682 sheet and 49 jobbing mills, having a total annual capacity of 5,616,000 net tons. The basis of the computation of capacity is 8.67 net tons per 8-hr. turn for sheet mills and 22.56 net tons per 8-hr. turn for jobbing mills, working 16 turns per week for 50 weeks.

Galvanizing pots operated by sheet steel manufacturers total 136, having an approximate "normal" capacity of 1,632,000 net tons. The directory lists 32 independent companies with details as to the productive capacity of each and also gives the official personnel of each company. A year ago there were 34 individual companies but since then the Superior Steel Co., Canton, Ohio, and the Chapman-Price Steel Co., Indianapolis, were combined and, with the Kokomo Steel & Wire Co., Kokomo, Ind., constitute the Continental Steel Corporation.

Staybolt Materials Compared

(*Continued from page* 1785)

always been peculiarly subject to rusting and pitting and one of the main considerations influencing the choice of material has been the inability to resist corrosion.

In this country, aside from a few isolated cases where copper has been used with copper firebox sheets, wrought iron has been used from the earliest days for staybolt material. When steel was substituted for wrought iron in the plates used for the construction of boilers, the staybolts continued to be made from iron as that material lent itself better for the purpose. It has adequate strength, ability to resist alternate bending stresses and was supposed to be inherently resistant to corrosion.

With the development and improvement of other materials, however, and the dropping off in the production of wrought iron, it was almost inevitable that inroads would be made into the field in which hitherto wrought iron had been used almost exclusively. Wrought iron differs essentially from steel in that it is a less homogeneous material. By its method of manufacture it is certain that it will contain stringers of slag. Its many proponents, among purchasers and users as well as the manufacturers, hold that it is these slag streaks

TABLE I—MECHANICAL AND CORROSION TESTS ON STAYBOLT MATERIAL

Mechanical Properties

Material	Analysis C	Mn	Si	Ni	Treatment	Proportional Limit, Lb. per Sq. In.	Yield Point, Lb. per Sq. In.	Tensile Strength, Lb. per Sq. In.	Elong.	R. A.	BHN	Impact	Fatigue: Endurance Limit	Fatigue: Stress to Cause Failure at 15,000 Cycles	Ratio Limit x 100 Over Ultimate	Stress at 15,000 Cycles Over Ultimate
Staybolt steel No. 1	0.06	0.02	0.01	...	As rec'd	.....	29,900	46,300	41.3	73.3	86	62	28,000	45,000	61	97
					1650 F. C.	.....	19,300	49,700	41.0	69.3	88	17	27,000	44,000	54	89
Wrought iron No. 2	0.02	0.04	0.13	...	As rec'd	.....	33,000	49,400	34.0	46.4	103	45	.....	.....	..	..
					1650 F. C.	29,500	30,300	46,500	36.5	49.3	95	32	.....	43,000	..	93
Wrought iron No. 3	0.06	0.04	0.09	...	As rec'd	.....	34,000	48,600	34.8	51.2	102	46	31,000	48,000	64	99
					1650 F. C.	.....	29,400	45,500	37.3	54.4	92	38	28,000	46,000	62	100
Staybolt steel No. 4	0.18	0.47	0.07	...	As rec'd	43,000	43,500	70,100	32.0	53.7	123	27	.....	.....	..	..
					1650 F. C.	33,500	34,100	63,800	32	51.1	112	9	31,000	49,000	49	77
Staybolt steel No. 5	0.15	0.36	0.03	...	As rec'd	32,000	32,250	58,800	39.5	65.2	110	69	30,000	49,000	51	83
					1650 F. C.	.....	33,000	53,000	38.3	62.1	101	12	30,000	46,000	57	87
Nickel staybolt steel No. 6	0.10	0.07	0.02	2.07	As rec'd	39,000	39,600	53,000	41.8	72.7	104	87	.....	.....	..	..
					1650 F. C.	40,000	41,500	53,700	43.5	79.0	102	87	.....	53,000	..	99
Nickel staybolt steel No. 7	0.08	0.04	0.02	1.98	As rec'd	.....	40,700	54,900	40.0	76.9	107	82	35,000	.....	64	..
					1650 F. C.	.....	42,700	55,100	43.8	77.0	103	83	32,000	51,000	58	93
Nickel steel No. 8	0.23	0.66	0.20	3.18	As rec'd	57,000	58,000	80,000	33.5	60.3	162	33	.....	.....	..	..
					1650 F. C.	50,500	52,400	77,000	34	55.4	140	33	.....	68,000	..	88
Nickel steel No. 9	0.23	0.58	0.16	3.52	As rec'd	51,000	57,100	86,300	29.0	58.5	182	57	49,000	70,000	57	81
					1650 F. C.	55,500	56,200	80,800	29.8	55.4	160	33	46,000	68,000	57	84

Corrosion Tests

Test Number	Solution	Temp., Deg. Fahr.	Time, Hr.	Aerated	No. 1 Staybolt Steel: Immersion Loss mg/dm$_2$/day	No. 1 Staybolt Steel: Total Loss mg/dm$_2$/day	No. 2 Wrought Iron: Immersion Loss mg/dm$_2$/day	No. 2 Wrought Iron: Total Loss mg/dm$_2$/day	No. 4 Staybolt Steel: Immersion Loss mg/dm^2/day	No. 4 Staybolt Steel: Total Loss mg/dm^2/day	No. 6 Ni Staybolt Steel: Immersion Loss mg/dm^2/day	No. 6 Ni Staybolt Steel: Total Loss mg/dm^2/day	No. 8 Nickel Steel: Immersion Loss mg/dm^2/day	No. 8 Nickel Steel: Total Loss mg/dm^2/day
1	NaCl pH$_4$	194	20	Yes	510	670	530	1,040	366	550	570	820	400	580
6	NaCl pH$_4$	194	20	Yes	....	....	1,310	1,410	....	....	....	....	1,270	1,370
7	NaCl pH$_4$	194	20	No	....	....	720	810	....	....	....	....	640	690
4	NaCl pH$_4$	194	24	No	1,320	1,350	1,110	1,230	1,120	1,170	1,240	1,350	1,290	1,410
2	NaCl pH$_{10}$	194	20	Yes	420	510	390	530	310	410	480	600	290	420
3	Bayonne water	194	48	Yes	450	530	540	760	410	500	380	690	680	760
5	Bayonne water	60	48	Yes	44*	170	26*	139	7*	200	7*	170	38*	210

*Gain in weight.

TABLE II—CHEMICAL AND PHYSICAL PROPERTIES AND HARDNESS

Chemical Composition

(*Average Analysis*)

	Carbon	Manganese	Sulphur	Phosphorus	Chromium	Vanadium	Nickel	Molybdenum
Staybolt iron	Under 0.10	0.11	0.025	0.07	....	....	....	....
Staybolt steel, "A"	0.16	0.44	0.037	0.009	0.12	....	0.26	....
Staybolt steel, "B"	Under 0.10	0.055	0.036	Trace	....	....	2.35	....
Staybolt steel, "C"	0.12	0.70	0.05	0.04	0.41	....	0.12	....

Physical Properties

(*Average Results*)

	Original Bar: Tensile Strength, Lb. per Sq. In.	Original Bar: Yield Point, Lb. per Sq. In.	Original Bar: Elongation	Original Bar: Red. of Area	Ends Pierced and Squared: Tensile Strength, Lb. per Sq. In.	Ends Pierced and Squared: Yield Point, Lb. per Sq. In.	Ends Pierced and Squared: Elongation	Ends Pierced and Squared: Red. of Area	Squared Ends Burnt Off: Tensile Strength, Lb. per Sq. In.	Squared Ends Burnt Off: Yield Point, Lb. per Sq. In.	Squared Ends Burnt Off: Elongation	Squared Ends Burnt Off: Red. of Area
Staybolt iron	48,051	35,074	37.0	51.92	48,555	32,319	32.4	52.95	49,144	32,705	33.7	53.69
Staybolt steel, "A"	58,902	37,983	40.05	65.10	59,650	40,579	33.9	67.06	63,761	44,414	31.8	66.31
Staybolt steel, "B"	53,905	44,171	38.8	68.51	52,680	40,849	39.8	71.58	52,525	40,447	40.05	71.64
Staybolt steel, "C"	66,396	56,534	38.2	68.63	64,633	46,829	36.2	68.99	64,631	47,500	35.45	69.31

Brinell Hardness

(*Average Results*)

	Original Bar	Pierced and Squared: Distance from Pierced End: ¼	1⅛	1¾	2⅜	3	3⅝	Pierced and Squared: Distance from Squared End: 1⅛	1¾	2⅜	3	3⅝	Pierced and Squared, Squared End Burned Off: Distance from Pierced End: ¼	1⅛	1¾	2⅜	3	3⅝	Distance from Squared End: 1⅛	1¾	2⅜	3	3⅝
Staybolt iron	109	112	111	111	111	106	108	108	109	109	104	109	110	112	112	110	105	107	107	109	112	111	111
Staybolt steel, "A"	116	116	115	115	114	114	114	116	116	114	115	116	116	117	117	116	115	115	129	128	124	126	126
Staybolt steel, "B"	125	97	102	105	105	105	106	105	106	107	108	109	95	102	105	105	105	106	107	107	108	108	108
Staybolt steel, "C"	147	126	130	132	133	136	138	132	134	135	138	140	127	132	133	135	137	138	136	135	137	139	147

that make the iron resistant to corrosion; that by breaking the course of an incipient crack they render the iron less liable to breakage, especially from fatigue and shock; that far from being a detriment, they actually confer on the iron its superior qualities. The author, without taking either side of the argument, finds it interesting to speculate on the possibilities of using in wrought iron the very alloy or alloys that enable steel to compete with it.

Within the past few years steel has been encroaching on wrought iron for staybolts. Called "steel" by virtue of the process of manufacture, it is essentially wrought iron without the fibers of slag. Contrary to usual developments, from the first most of the steel used for staybolts contained some alloying element, usually nickel, but sometimes copper, chromium or molybdenum. The reasons for using such steels are that they are stronger than plain steel with the same or greater toughness, as indicated by the elongation and reduction of area, that they have a higher resistance to fatigue and impact, and that, particularly, those containing copper and nickel prove in service to offer satisfactory resistance to corrosion.

Wrought Iron and Alloy Steel Investigated

For the purpose of securing comparative data on the characteristics of staybolt material, two independent investigations were undertaken, the results of which are herewith reported. In the first, which was performed in a laboratory on material purchased from commercial sources, the analysis, tensile characteristics, fatigue and impact resistance were determined as well as the resistance to corrosion. These data are shown in Table I. These tests were made on 1-in. bars as received and after annealing, the materials being hot-rolled low-carbon steel; hot-rolled staybolt iron; hot-rolled staybolt steel; hot-rolled staybolt steel containing 2 per cent nickel and a fairly low carbon 3.50 per cent nickel steel.

The results show the best combination of qualities is to be had in 2 per cent nickel staybolt steel with very low carbon. The yield point and ultimate tensile strength, while not the highest, are sufficiently high; the impact value is on the average more than twice as great as for any other material, and the endurance limit is only exceeded by the 3.50 per cent nickel steel which is considerably higher in carbon.

Under the test conditions, no one material was markedly superior in resisting corrosion. Test conditions, however, do not duplicate service conditions.

Railroads Make Comparative Tests

The second test, results of which are shown in Table II, was more practical in nature and was conducted by one of the leading railroads. Here three staybolt steels of varying composition and one staybolt iron were actually put through the processes of manufacture and driven in boilers. The materials were tested for tensile characteristics before any work was done on them, at different stages during manufacture, and finally five staybolts, ready for driving, were picked at random and tested after giving them the same treatment as driven bolts.

Of these steels one contained about 0.25 per cent nickel and a small amount of chromium, one contained over 2 per cent nickel and one contained 0.50 per cent chromium and a small proportion of nickel. The one containing chromium showed slightly better strength but the elongation and reduction of area were diminished by the working while the 2 per cent nickel steel showed an increase in these properties.

The conclusions drawn from both tests are that steel containing about 2 per cent nickel is a superior product for staybolt purposes.

LATIN-AMERICAN TOOL MARKET

Brazil the Largest Customer—United States Supplies 31 Per Cent of Total Requirements

TO all intents and purposes Latin-America is completely a consuming market for hand tools, according to a report by the Industrial Machinery Division, Department of Commerce. What little production of tools is accomplished there is limited both as to product and quantity.

This dependence on foreign sources, however, has not robbed the territory of a certain discriminating taste as to the tools which it will buy. Though the area is still essentially a price market, there is a distinct tendency manifest in many of the individual markets toward an appreciation of quality and performance in tools. Because of this dual demand, the area has come to prefer the tools of certain countries. Those of the United States are demanded where quality, rather than price, rules; those of German origin where initial price is the determining factor; those of Great Britain to a certain extent for both extremes.

Approximately one-third of the 1925 exports of tools from the United States, in point of value, went to Central and South America. Similarly, practically one-third of the imports of tools in seven of the leading importing countries came from the United States. Great Britain, with a slightly larger percentage, and Germany, with somewhat more than one-fourth of the total, were our leading competitors. All other countries combined furnished less than one-tenth of the total.

From the table it will be noted that the United States furnished between 63 and 73 per cent of the total tool requirements, by weight, of Cuba, Mexico and Colombia. Almost half the requirements of Peru and about one-third those of Argentina came from this country. To Brazil, however, where Great Britain and Germany had a large preponderance in the trade, the United States furnished only one-eighth, and but slightly more than one-fifth of the Chilean imports.

Imports of Tools Into the Principal Latin-American Tool Markets, 1925
(In kilograms)

Country	From United States	Per Cent	United Kingdom	Germany	France	Belgium	Other	Total
Argentina	1,224,372	34.2	538,155	911,718	269,209	392,197	248,328	3,583,979
Brazil	1,374,872	13.0	5,086,150	3,400,547	355,739	13,241	356,528	10,587,077
Chile	120,237	20.2	357,667	83,156	5,017	13,390	14,545	594,012
Colombia*	147,145	63.6	20,149	52,339	4,092	1,985	5,720	231,429
Cuba	862,026	69.4	189,396	135,811	11,481	36,942	5,832	1,241,488
Mexico	2,185,046	72.2	143,073	621,842	25,350	24,955	25,875	3,026,141
Peru	230,614	47.8	61,158	110,806	23,405	2,676	54,369	483,028
Total	6,144,312		6,395,748	5,316,219	694,293	485,386	711,197	19,747,154
Per cent of all	31.11		32.39	26.92	3.52	2.46	3.60	

*1924 figures (latest available).

Great Increase in Airplanes Made

WASHINGTON, Dec. 27.—Production of airplanes in the United States during the present year will far exceed that during 1926, according to estimates of the aeronautics branch of the Department of Commerce. In 1926 the airplane manufacturing industry proper reported 1186 planes produced, while thus far this year only one-third of the industry has already reported a production of 1525 planes, with unfilled orders amounting to 1239.

BENEFITS OF HIGH WAGES

Secretary of Labor Traces Changes of 20 Years —Urges Puddling Machine

WASHINGTON, Dec. 27.—So long as the worker is paid in proportion to his greater productiveness, no fear need be felt for the high-speed machinery that is constantly being introduced into industry, says Secretary of Labor James J. Davis in his annual report. Credit is given the American employer for seeing good business in paying good wages. Prosperity is declared to have been the result, crowding the home market with millions of ready customers and buyers and improving the standard of living.

Comparing the rates of wages in the organized trades and taking the average wage rate of 1913 as the basis—100—the report says the hourly rates of wages of such workers have increased from an index of 89.7 in 1907 to 259.5 in 1927. On the same basis the weekly hours of work have decreased from 102.6 in 1907 to 92.4 in 1927. The full-time weekly wage rates have increased from 91.5 in 1907 to 240.8 in 1927.

Since 1899, taking all manufactured goods together, production per man has increased 49 per cent, the report says. Yet in 1925, it is pointed out, exports were only 4.9 per cent of production, proving that the home market had absorbed more than the entire increase in his own productive powers since 1899. Mr. Davis contends that "A dullard must see the folly of killing the purchasing power (by reducing wages) of the greatest buyer, the worker, in the market at home which provides us with all but a fraction of our national wealth and prosperity."

Machinery Needed in Making Wrought Iron

"Puddling is the only step in iron manufacture where no machine has yet been devised to take the place of the human touch," Mr. Davis points out. "The iron puddler still does the same work. With heavy tools he still kneads and otherwise manipulates the 200-lb. ball of iron in its fiery furnace. No mechanical contrivance has yet displaced the trained eye which tells the puddler when the iron is free at last from all impurities and ready for the rolls. But I am hopeful that before long inventive genius will supply some such machine."

Malleable Castings Production and Orders Make Low Tonnage

WASHINGTON, Dec. 24.—Production of malleable castings in November totaled 40,845 tons, against 46,765 tons in October, according to reports received by the Department of Commerce from 134 identical plants. It was the lowest output for any month of either 1927 or 1926. Orders booked in November amounted to 34,624 tons, compared with 39,494 tons in October. This also was the smallest amount of new business taken for any month of either of the two years. Operations in November were at the rate of 40.5 per cent of capacity as compared with 46 per cent in October. Shipments in November were 37,986 tons, against 41,666 tons in October.

Production for the 11 months ended with November amounted to 583,512 tons, compared with 665,367 tons for the corresponding period of last year. Orders were 514,943 tons and 567,898 tons, and shipments 566,440 tons and 640,816 tons, respectively.

British Industries Fair to Be Held Feb. 20 to March 2

Great Britain's advance in engine, machinery and tool production will be evident at the enlarged Birmingham section of the British Industries Fair to be held from Feb. 20 to March 2, 1928.

New devices and improved machinery for many kinds of iron, steel and wood work, tool making and hardware production will be shown. Representative groups of malleable and gray iron castings as used by the cycle, motor car and motor bus manufacturers; tubings, grinding disks, a comprehensive exhibit of springs, covering practically every trade where springs are used; trucks made of tubular steel with rubber tires and ball bearings; wrought iron tube fittings; black and bright steel strip; and exhibits showing the applications of metals to new ideas will also be on view.

Heavier Orders for Steel Furniture

WASHINGTON, Dec. 27.—Orders for steel furniture in the "business group" in November were valued at $2,476,230, against $2,410,552 in October, according to reports received by the Department of Commerce from 33 manufacturers. Unfilled orders were valued at $1,577,410, compared with $1,574,461, while shipments were valued at $2,856,181 and $2,379,557, respectively. For the 11 months ended with November orders were valued at $27,910,029, against $28,590,846 for the corresponding period of 1926.

Orders for steel furniture in the shelving group in November were valued at $574,763, against $551,259 in October, according to reports received from 15 companies. Unfilled orders were valued at $650,908 and $665,970, respectively, while shipments were valued at $590,764 and $619,293, respectively. For the 11 months orders were valued at $6,731,846, compared with $6,778,372 for the corresponding period of last year, and shipments were valued at $6,686,372 and $6,715,244, respectively.

Coke Oven Plant for Philadelphia

The Koppers Co., Pittsburgh, has announced that it will build and finance the construction of an $8,000,000 by-product coke plant in Philadelphia to augment the present supply of gas supplied to that city by the United Gas Improvement Co. The City Council of Philadelphia last week authorized the building of the plant, following an exhaustive inquiry conducted by William Hutton Blauvelt, New York, consulting engineer in the coke industry.

Gas will be supplied to the United Gas Improvement Co. at 34c. per 1000 ft., which will enable the company to continue the present rate of $1 per 1000 ft. to consumers. The plant will have a capacity of 5,000,000,000 cu. ft. of gas per year, increasing the gas supply of Philadelphia by 25 per cent.

The plant authorized will supply gas for the northern section of Philadelphia, and another plant is still under consideration to augment the supply of gas for the southern section. This latter project includes a plan proposed by the Delaware River Steel Co., Chester, Pa., for the construction of a blast furnace to utilize some of the coke.

A Comprehensive Bibliography on Cast Iron

An extensive bibliography on cast iron has been prepared under the auspices of the subcommittee on research of the cast iron committee of the American Foundrymen's Association and is now available in its preliminary mimeographed form. An attempt has been made to bring together abstracted references to all foreign and domestic articles on this subject printed since 1858. The publication includes approximately 1500 references. There is a subject index in the first part of the book giving reference numbers to each subject, followed by the authors' index. A limited number of copies are available at $5, and can be obtained through the office of the secretary at 140 South Dearborn Street, Chicago.

British Steel Exports Increase While Imports Drop

WASHINGTON, Dec. 23.—Increasing by 14,273 tons, or 3.7 per cent, exports of iron and steel products from the United Kingdom in November totaled 399,054 tons, against 384,781 tons in October, according to a cablegram received by the Iron and Steel Division, Department of Commerce, from Commercial Attaché William L. Cooper, London. Imports, on the other hand, dropped to 284,764 tons, compared with 336,020 tons in October, a decline of 51,256 tons or 15.3 per cent.

The dispatch says that the increase of 6078 tons in exports of tin plate is especially significant. Over most of the present year this industry has been operating at a much lower level than that ordinarily maintained. The reduced imports, it is stated, were gratifying, especially in view of the efforts of British steel makers to combat the influx of Continental steel by means of the rebate scheme for all-British purchases of semi-finished goods.

British Foreign Trade In Iron and Steel During October and November, 1927
(In Gross Tons)

	Imports		Exports	
	Oct.	Nov.	Oct.	Nov.
Pig iron and ferroalloys	39,898	22,984	30,863	32,704
Ingots, blooms, billets and slabs	152,901	126,016	1,524	668
Iron bars, rods and angles	19,813	23,676	3,101	4,471
Steel bars, rods and angles	42,826	38,142	27,567	28,291
Structural steel	12,862	8,137	8,162	10,028
Hoops and strips	11,805	14,181	4,154	5,407
Plates and sheets	22,986	18,508	37,725	39,163
Galvanized sheets	.....	.....	66,687	65,277
Tin plate	.....	.....	36,027	42,105
Cast tubes, pipes and fittings	3,220	4,470	12,021	12,877
Wrought tubes, pipes and fittings	4,440	5,146	25,518	27,117
Rails	1,420	1,582	48,874	45,378
Other railroad material	524	783	34,568	30,850
Wire	4,036	5,215	5,353	6,527
Wire cable and rope	....	....	2,053	2,196
Wire nails, including staples	5,608	4,843	209	230
Other wire manufacturers	561	357	1,384	1,618
Nails, tacks, rivets and washers	772	980	1,804	2,152
Bolts, nuts and metal screws	1,101	985	2,397	3,374
Iron and steel castings	1,849	1,209	213	293
Iron and steel forgings	1,418	1,123	52	30
All other	7,980	6,427	34,525	38,298
Total	336,020	284,764	384,781	399,054

Declines in imports were reflected principally in pig iron, ingots, blooms, billets, structural steel, steel bars, plates and sheets. Increases were shown in imports of iron bars, hoops and bands, cast tubes and wire. While the largest increase in the export movement was made in tin plate, gains were made also in pig iron, wrought tubes, plates, black sheets and iron bars. There were decreases in railroad materials, rails and galvanized sheets.

Production of pig iron in the United Kingdom declined 20,400 tons under October to 575,900 tons in November, the lowest output for any month since February. The output of raw steel remained at almost the same level as in October, with the November figure of 698,700 tons, only 300 tons below that of the preceding month. Reports at the end of November indicated that the number of blast furnaces had declined to 155 from 162 at the end of October, while the number of open-hearth furnaces operating had increased by 19 to 266.

Gas Industry Makes New Record

Estimates for sales of manufactured gas in the United States in 1927, made by the American Gas Association, indicate a figure nearly 5 per cent in excess of the previous high record, which was that of 1926. The estimate for 1927 is 475,000,000,000 cu. ft. About 70 per cent of the total went for household purposes and 29 per cent for industrial and commercial uses. Under the latter classification the gain during the year is placed at 9,000,000,000 cu. ft.

Customers are reported at a total of 11,400,000, to which should be added 3,331,000 customers for natural gas. Sales of natural gas go far beyond the manufactured gas in volume. Estimates for 1927 show a total of 1,239,000,000,000 cu. ft. Gross revenue from both types of gas is placed at $785,000,000, of which about two-thirds represents manufactured gas.

Higher Exports and Imports of Steel Products in November

WASHINGTON, Dec. 24.—Both exports and imports of iron and steel products showed increases in November when compared with October, according to preliminary figures compiled by the Department of Commerce. Outgoing shipments were 177,928 gross tons, an increase of 7673 tons, and imports were 61,882 tons, a gain of 9389 tons. Tin plate constituted the principal item of exportation in November, with a total of 18,121 tons. Other products representing the larger movements to foreign markets during the month were scrap, 15,392 tons; skelp, 14,667 tons; boiler and other plates, 11,794 tons, and rails, 10,849 tons.

Among the imports pig iron, with a total of 16,142 tons, was the principal product received, followed in order by structural shapes, 14,479 tons; scrap, 6404 tons, and cast iron pipe, 4042 tons.

The cumulative export trade for the 11 months of 1927 aggregated 2,012,541 tons, against 1,969,022 tons for the corresponding period of last year. Imports on the other hand showed a decrease during the 11 months of the current year, with a total of only 686,279 tons against 1,034,583 tons for the 11-month period of 1926.

Heavy Decline in Automobile Output in November

WASHINGTON, Dec. 24.—November production of motor vehicles in the United States was 133,202, of which 108,903 were passenger cars and 24,299 were trucks, according to reports received by the Department of Commerce. This compares with 219,610 in October, of which 182,941 were passenger cars and 36,669 were trucks. The November output was the smallest for any month of the past four years, both for passenger cars and trucks.

Canadian production in November totaled 6617, of which 5173 were passenger cars and 1444 were trucks. This compares with 7791 in October, of which 6236 were passenger cars and 1555 were trucks.

Total production in the United States for the 11 months ended with November was 3,259,317, of which 2,832,117 were passenger cars and 427,200 were trucks. This compares with 4,130,863 for the corresponding period of last year, of which 3,668,903 were passenger cars and 461,960 were trucks.

Sharp Decrease in Bookings of Fabricated Steel Plate

WASHINGTON, Dec. 24.—Making the smallest showing for any month of last year and the present year, bookings of fabricated steel plate in November amounted to 26,940 tons, according to reports received by the Department of Commerce from 51 firms. The rate of operation was 33.8 per cent. Bookings in October totaled 46,540 tons, with operations at 57.5 per cent of capacity.

Of the November orders, 8920 tons was for oil storage tanks; 2875 tons for refinery materials and equipment; 3352 tons for tank cars; 978 tons for gas holders; 422 tons for blast furnaces and 10,393 tons for stacks and miscellaneous purposes.

Bookings for the 11 months ended with November aggregated 461,098 tons, compared with 484,055 tons for the corresponding period of 1926.

Determination of Nitrogen in Steel

Scientific Paper No. 563, by Louis Jordan and James R. Eckman of the United States Bureau of Standards, Washington (Price, 10c.), gives detailed instructions for the determination of total nitrogen in metals or gas mixtures. A high-frequency induction furnace is evacuated, the metal sample is fused in a graphite crucible, and the evolved gases passed through calcium vapor. Calcium nitride is thus formed, which is converted into ammonia by hydrochloric acid, and the ammonia determined by volumetric analysis.

This method should reveal any uncombined nitrogen which may escape the acid-solution analysis method.

BRITISH BUSINESS SLACK

Rebate Plan Fairly Successful—Pig Iron Producers Try to Meet Foreign Prices in Scotland

LONDON, ENGLAND, Dec. 9.—The past fortnight has brought about no material change in the iron and steel market and business continues rather limited. Importation of Continental material is still large, but is diminishing somewhat as recent purchasing has declined. The rebate plan of the British mills has brought in a little more work, but the concessions granted to consumers using only domestic material have not been quite so attractive as had been expected. The shipbuilding industry has taken advantage of the rebate plan and some good business has been booked from this source, but a good steady export trade is still being sought. There has been some improvement in export business as compared with last year, but conditions are far from normal.

Pig iron has been rather quiet lately and purchases have been smaller than in previous weeks. Most of the Cleveland furnaces, however, have rather good backlogs on both foundry and forge grades. Stocks of hematite iron are still large. Toward the end of November, Cleveland producers decided to drop the 2s. 6d. (61c.) per ton extra charge to domestic consumers, so that both domestic and export prices are now in line. No. 3 foundry is about £3 5s. ($15.90) per gross ton for either domestic or export shipment.

Other United Kingdom consumers have complained at the special concessions granted on sales to Scottish buyers, but the practice has been continued as producers are determined to recapture if possible the Scottish market, which has been lost to Continental sellers since the coal strike. Their efforts have met with some success and the more recent establishment of an office in Glasgow for direct sales is expected to aid still more, although it has been a direct blow at the merchant. The first quotations made by this office were about 1s. (24c.) per ton under the previous prices.

German Hoop Makers Try British Rebate Plan

HAMBURG, GERMANY, Dec. 10.—Patterned on the recently instituted British system of rebates to steel users buying only domestic material, an agreement has been signed between the German Hoop Makers' Syndicate and the consumers. Imports of hoops and bands were rather large in recent months and to meet this competition, the German manufacturers have offered a rebate of 10 m., 12 m. or 14 m. ($2.39, $2.67 or $3.35) per ton, depending upon the tonnage involved, given to all German consumers who agree to purchase no foreign hoops or material from makers who are not members of the syndicate. Full agreement to this plan has not yet been obtained from all producers and consumers, but it is believed that a sufficient number have signed to make it successful.

Meeting of Steel Cartel Brings No Change

HAMBURG, GERMANY, Dec. 10.—The meeting of the International Steel Cartel in Brussels, Dec. 8 and 9, brought about no change in the present rather unsatisfactory situation. The meeting was attended by about 60 delegates from the member countries. Allotments and penalties for over-production were left unchanged and no action was taken toward the hoped for formation of selling syndicates for bars, beams and semi-finished material. The delegates of Belgian mills offered to accept the French demand for an increased allotment provided the French mills would agree to cease selling in the Belgian domestic market, but the French refused.

The third Midwest Power Conference will be held at the Hotel Stevens, Chicago, during the week of the third Chicago Power Show, Feb. 14-17. The exhibition will be at the Coliseum.

GERMAN STEEL NOT DUMPED

Secretary of Treasury Dismisses Complaint but Says Situation Will Be Watched

WASHINGTON, Dec. 27.—The finding of the Secretary of the Treasury, in a decision made public last Friday, that German steel is not being dumped into the United States, occasioned no surprise. Reports in circulation recently were to the effect that the long-considered matter had been decided against independent domestic steel producers, led by the Bethlehem Steel Co., who submitted their case before the customs division of the Treasury Department on Aug. 4.

That the Treasury Department had difficulty in reaching its conclusion is indicated by the statement of Secretary Mellon that the question was a close one and that the situation will be carefully watched to prevent injury to American industry. It is known that the customs division had prepared a finding for the signature of the Secretary within a comparatively short time after the case was presented, and, while there is no confirmation of the report that the original draft was favorable to the domestic producers, it was returned to the customs division for further consideration.

The statement given out by the Treasury Department follows:

> The Secretary of the Treasury announced that after extended investigation and careful consideration of all evidence presented by and on behalf of the parties in interest he had reached the conclusion that finding of dumping with respect to importations of steel products from Germany was not justified.
>
> The Secretary said that the question was a close one and that while present conditions and prices did not seem to justify a finding of dumping the entire situation would continue to be carefully watched by the Treasury Department so that, should conditions change, the necessary steps might be taken at once to prevent American industry from being subjected to unfair competition within the meaning of the anti-dumping section of the Emergency Tariff Act.

The case grew out of a previous effort of the American steel manufacturers to have the Treasury Department apply countervailing duties against imports of German iron and steel, which, it was claimed, were being subsidized by Government bounties. After a prolonged investigation, in the course of which the German embassy in Washington intervened, it was held that no bounties were being paid on rolled steel products, and the case was dismissed. Subsequently application was made by the American steel producers for an anti-dumping order against German steel, and a broad investigation was made. Meanwile, an anti-dumping order, still in effect, was issued against imports of German pig iron.

In the anti-dumping case regarding German steel imports domestic makers charged that importations from Germany had reached such amounts in tonnage and were sold at such low prices that their effect had been felt throughout the domestic industry. Elaborate statements and data were submitted in support of the charge.

International Tube Cartel in Almost Complete Control

HAMBURG, GERMANY, Dec. 10.—European tube production has been almost completely consolidated into three large central sales offices. The Paris office handles the sales of French, Belgian, Luxemburg and Saar production, the Düsseldorf office sells the output of German and Czechoslovakian mills and a third now being opened at Kattowitz will sell Polish tubes. Austrian and Hungarian tube mills, although not members of the international cartel, have, it is understood, agreed not to undersell. The only outsiders of consequence are the tube works at Dillingen in the Saar, Ferrum A. G. at Kattowitz, Poland, which is a large exporter, especially to Japan, and the Jackels A. G. at Freistadt, Czechoslovakia. The total output of these outside mills is about 130,000 tons a year. British tube makers are still outsiders and recent negotiations for their inclusion in the cartel have definitely failed. Their competition, however, is not serious at present.

How to Develop Better Foremen

(*Concluded from page* 1795)

whose especial interest it is proposed, and the value, to the enterprise, of the realizable result.

Tact Essential to Success of Program

To insure the ready acquiescence and hearty cooperation of the foremen, care must be taken in the introduction of the program. It cannot be forced upon them by arbitrary means, as something to which they must submit for their own good, whether they want to or not, and which is to supersede them in any part of their authority or responsibility.

Rather, it must be presented to them tactfully in its true light—as an earnest desire on the part of management to assume its rightful share of their burdens, to aid them in overcoming difficulties which heretofore they have faced alone, to create greater harmony throughout the entire organization, to make available to all the knowledge and experience of each one, to render their tasks easier by the assurance of adequate support when desired, to create throughout the entire organization a spirit of working *with* each other for the welfare of all—dissipating the too prevalent thought of working *for* the company.

How to Maintain Interest in the Plan

If, through a proper approach, the confidence and hearty cooperation of the foreman is gained at the outset, the success of a development plan then rests upon the manner in which the details are carried into effect.

To maintain a continuity of interest conferences should be as short as is compatible with business to be attended to, and conducted in an orderly manner. Short, lively meetings, held frequently, are productive of better results than a smaller number of long duration.

A definite agenda should be prepared for each meeting, and, while exercising proper regard for the courtesy due those in attendance, the chairman should see to it that the subject in hand is closely adhered to in the discussion, with remarks reasonably limited as to length of time occupied in their presentation, and that a decisive disposition, of a temporary or permanent nature, is made of each subject presented.

Too often projects of this character have come to an untimely end because of failure on the part of the leader to check quietly a natural tendency on the part of some individuals to wander away from the subject and to prolong their remarks unduly.

In the functioning of the plan there should be applied a judicious admixture of theory and practice, calculated to arouse a desire in the mind of the individual for a more extended acquaintance with theory, while coincidently stressing the recognized importance to the proceedings of the practical knowledge which he already possesses.

Inspection of Bored Forgings

Instruments for examining and photographing the interior of bored holes (such as in counterbored shafts or rifles) have frequently been constructed to order. Three sizes have now been standardized and placed on the market by Herman A. Holz, 17 Madison Avenue, New York, under the name of "Borescope."

Borescopes for sporting rifles are made 5 mm. or 7 mm. outside diameter by 60 cm. long. The end of the tube thrust into the bore has a small incandescent lamp, connected to an external dry cell. Just ahead of the lamp is a mirror at 45 deg., which deflects the line of sight out through an appropriate window to the illuminated wall of the bore. A focussing eyepiece at the external end of the tube gives a magnified image. Essentially the same device, with some auxiliaries permitted by the enlarged dimensions, is built into a borescope for 1½ in. holes, 25 ft. long.

The optical field of any of the above instruments is rather small, and it has to be turned into several positions at each depth in order to examine the entire inner surface. In borescopes for holes larger than 2½ in. diameter the optical system is built like a telescope, and consists of a focussing eyepiece at the external end and a wide angle lens system at the exact center of the inner end. A cluster of six or eight lights surrounds the objective and illuminates the bore, so that the entire circumference is viewed. As observed it appears to be drawn into the shape of an old-fashioned talking machine horn. An entire bore can be inspected by this device by simply pushing it slowly through the hole.

Large borescopes can be made to order with length 100 times the diameter. The maker states that internal reflections may be suppressed, yellow and red rays from the incandescent lamp filtered out, and maximum contrast in natural colors obtained. Any field may be photographed by placing a metal plate holder at the focal plane of the eyepiece. Defects are best studied from enlarged prints of these negatives.

New Process for Manufacturing Ferrophosphorous

BY JOHN BOYLE, JR.

A two-stage process for manufacturing ferro-phosphorus in the blast furnace was patented Oct. 18 by Joseph Warner of the Warner Iron Co., Nashville, Tenn. (No. 1,646,268). In the first step a low ferro-phosphorus, 10 to 17 per cent, is obtained; a portion of this low phosphorus alloy is then charged into the blast furnace a second time and the percentage of phosphorus raised to 22 to 25 per cent.

In the Warner process a minimum amount of slag is produced by using metallic iron in the charge. In any combination of materials which may form the charge it is essential that the total amount of silica shall be relatively small. The coke, phosphate rock and the iron bearing material are charged into the blast furnace in such proportions that the lime in the phosphate rock or bone phosphate is only enough to combine with the limited amount of silicious and acid oxides (other than P_2O_5) in the charge.

In order to increase the phosphorus content of the low grade alloy made in this first smelting it is put through the furnace the second time, forming for instance 40 to 60 per cent of the charge, the remainder of the burden being as in the first step.

The process is adapted to operate with mill scale, mill cinder, turnings, borings and other metallic substances, as well as iron ore. The very much reduced amount of silicious matter in proportion to the metal produced results in a normal working furnace and a very small slag volume.

It is believed that a 22 to 25 per cent ferro-phosphorus can be made in a blast furnace by this process as cheaply as the 18 per cent is otherwise produced.

Metal Lath Exports to Chile

Chile offers an exceptional potential market for the sale of metal lath, according to a report received by the Department of Commerce from Assistant Commercial Attaché Robert G. Glover, Santiago. It will be necessary, however, he states, to engage in considerable missionary work along lines intended to educate prospective purchasers in this market that structures employing this product are fully the equal of those constructed of adobe brick, as to ability to withstand the ravages of earthquakes. The report points out that successful demonstrations of the permanency and all-around satisfaction of construction employing metal lath have resulted in its use in many places where previously adobe brick would have been the only material considered.

Importations of expanded metal, or metal lath, into Chile increased to 637 metric tons in 1926, against 230 tons in 1924. Over this period it is estimated that the United States has furnished 85 per cent, with the remaining 15 per cent divided among Great Britain, Germany and Belgium, in the order named.

A list of dealers in building materials in Chile, who might be interested in adding American metal lath to their line of products, is available to accredited firms upon application to the Commercial Intelligence Division, Bureau of Foreign and Domestic Commerce.

Steel Companies Defend Reductions in Export Rates

Mills in Western Pennsylvania, Ohio and West Virginia Answer Protests of Bethlehem Steel Co. and Kansas Farming Organizations

WASHINGTON, Dec. 27.—Protests of the Bethlehem Steel Co. and farm organizations of Kansas against tariffs proposing decreases in export rates on iron and steel products are not justified, according to a statement filed with the Interstate Commerce Commission by the Jones & Laughlin Steel Corporation.

"The obvious motive is self-interest of Bethlehem in its competition with other members of the industry," said the Jones & Laughlin memorandum, "in disregard of the interests of the industry as a whole, the carriers' judgment of their best interests, and general business conditions to the extent that they are involved with steel and railroad activity.

"The protest filed by counsel for the farm organizations of Kansas calls for little reply. The protest rests on the Hoch-Smith resolution. It alleges that reduction of export rates on steel will reduce aggregate revenues to the point of endangering that preferred treatment of agricultural products called for in the Hoch-Smith resolution. No facts are submitted to support the assumption that the reduced rates will reduce aggregate revenue. Contrary to the farm organizations' protest, we have the judgment of the carriers that the reduced rates will increase traffic to the benefit of total revenue."

Contentions of Farmers

Briefly, the farmers' memorandum contends that the inquiry being made into iron and steel rates throughout Official Classification territory is in accordance with the Hoch-Smith resolution, that the export rate situation should be considered in connection with it and that no separate action on the latter should be taken. It is contended that if the proposed tariffs were allowed to become effective the object of the Hoch-Smith resolution would be defeated. The farmers' organization further asserts that the inquiry by the commission of agricultural rates is being made under the Hoch-Smith resolution as a whole, with no separate rates proposed, and that a similar course should be pursued with regard to iron and steel rates. The organizations filing the memorandum are the Cooperative and Educational Union of Kansas, the Kansas State Grange, the Kansas State Farm Bureau, the Southwest Cooperative Grain Marketing Association, the Kansas Cooperative Wheat Marketing Association, the Kansas Farmers' Cooperative Commission Co. and the Kansas Cooperative Grain Dealers' Association.

Railroads Not Overstepping Authority

In further defense of the action of the carriers, the Jones & Laughlin memorandum says: "It is wholly safe to assume that the conditions surrounding the export trade were fully presented to the carriers. It must be assumed that carriers acted in good faith and upon their best judgment. There is nothing in the Interstate Commerce act detrimental to the carriers' right to initiate rates. It is taken for granted that the commission welcomes the sound exercise of judgment by the carriers and does not seek to substitute itself as manager of the railroads; further, that the power to fix minimum rates is one which the commission has exercised sparingly, and properly so, in keeping with the extreme nature of the power. In these circumstances an extraordinary degree of proof, the strongest sort of prima facie case, should be required before the commission will exercise its power to suspend these reductions."

R. B. Robinson, general traffic manager Central Alloy Steel Corporation, Massillon, Ohio, filed a statement saying that the reduction would assist the company in foreign competition and would stimulate foreign buying. The company, it was declared, had had but little export business since the war and believed that the reduction would stimulate foreign trade, especially in South America.

Supporting the proposed reduced rates, the National Malleable & Steel Castings Co., Cleveland, through its traffic manager, C. T. Stripp, declared they are necessary in view of "our steadily decreasing exports of iron and steel."

Similar contention as to the necessity of the reduced rates becoming effective was made in statements by the Trumbull Steel Co., Warren, Ohio, and the Wheeling Steel Corporation, Wheeling, W. Va.

Pittsburgh Not Only Point Benefited

The Koppel Industrial Car & Equipment Co., with plant at Koppel, Pa., in favoring the reduced export rates declared that their application is necessary. Approximately 75 per cent of its product, it told the commission, is in direct competition with foreign manufacturers. F. M. Garland, general traffic manager, in a communication accompanying the company's statement favoring the reductions, said:

"We are confronted in this country not only with a business depression, but greater and wider competition with foreign goods. This isn't only a matter between the United States Steel Corporation and Bethlehem. It isn't, as I understand it, an adjustment in rates that upon any standard of test may be deemed unreasonable. It is simply a voluntary contribution upon the part of the carriers by way of reductions to meet foreign competition."

It was declared by Mr. Garland that Pittsburgh is not the only point to benefit by these reductions. Bethlehem's rates, he said, have been relatively reduced. The Koppel company, he declared, has secured substantial export orders and is waiting until the rates go into effect to begin shipping. This company, it was further stated, during the past few months has been in close touch with its foreign agents to determine how close its competition will be for 1928. "The shadow looms large," the statement went on, "for our London agent paid us a visit several weeks ago and described how the European factories, for instance, are striving through every method to lower their production costs by employing every known up-to-date method of cutting corners, producing the finished articles on the shipping platforms without rehandling and putting into use every device that would mean economy in its strictest terms."

The Youngstown Sheet & Tube Co., and the Republic Iron & Steel Co., Youngstown, Ohio, favored the reduced rates, and claimed they would stimulate their export markets.

The Phoenix Iron Co., with plant at Phoenixville, Pa., supporting the Bethlehem protest, which opposed the proposed rates, said: "It seems that the new export rates are merely the product of an agreement between certain powerful and influential parties and the Trunk Line carriers and we feel that it would therefore be folly for your honorable commission to have its power usurped in this manner," said the protest.

Opposition to the proposed rates also was expressed by the South Chester Tube Co., Chester, Pa.

The Concrete Reinforcing Steel Institute, Tribune Tower, Chicago, has published a handbook on reinforced concrete which contains a chapter on design and the code of standard practice of the Institute members. It is being distributed to 15,000 architects and engineers.

Directors of the Concrete Reinforcing Steel Institute, at their quarterly meeting, held in Chicago, Dec. 13, selected Biloxi, Miss., as the place for the fourth annual meeting of the institute. Sessions will be held March 19 to March 21, 1928, at the Edgewater Gulf Hotel.

Machinery Markets and News of the Works

YEAR ENDS SATISFACTORILY

Machine Tool Buying Below That of 1926 But Prospects Improve

Norfolk & Western Railway Contributes the Largest Orders of the Week, but General Buying in December Has Been Fair

WHILE machine tool business for 1927 has averaged 10 to 20 per cent lower in volume than 1926, the trade enters the new year with the expectation that buying may take a slight upswing, at least during the first quarter or first half. Business in December has been better than expected, but tool builders will have fewer unshipped orders on their books on Jan. 1 than they had a year ago.

The automobile industry yielded far less business in 1927 than in 1926, but more is expected from this source with the renewed competition that will follow the introduction of the new Ford models. Railroads have proved a disappointment as a source of orders, their purchases having been relatively unimportant.

Price advances have brought out some of the orders of the last few weeks. Advances now extend to some makes of planers, while a manufacturer of turret lathes has put up prices 10 per cent, effective immediately.

The largest buying of the week was from the Norfolk & Western, which has continued distribution of orders against its list of more than 100 items.

New York

NEW YORK, Dec. 27.

AS was to be expected, the several days preceding Christmas brought a decline in machine tool buying, but the month as a whole will be fairly satisfactory, considering that quite a number of orders have been promised for this week. Distribution of orders by the Norfolk & Western Railroad has brought some business to this district. The developments in December, which have been of a favorable character, have created expectations of a somewhat better volume of business in the first quarter of the new year.

Blacker Engineering Co., Grand Central Terminal, New York, has received an order from Norfolk & Western Railroad for four blacksmiths' hammers; orders have also been received for one hammer each from Big Four Railroad, General Electric Co., Fort Wayne, Ind., and Eastern Massachusetts Street Railways.

Atlantic Gypsum Products Co., 40 Central Street, Boston, J. Clifford Woodhull, president, manufacturer of structural building materials, etc., will erect new plant at 150th Street and East River, New York, to cost more than $75,000 with equipment. H. J. Brown is company engineer, address noted.

Gronenberg & Leuchtag, 1385 Broadway, New York, architects, have filed plans for a seven-story automobile service, repair and garage building, 75 x 200 ft., to cost about $500,000 with equipment.

Board of Education, South Broadway, Yonkers, N. Y., has plans for a two-story addition to the Saunders trade and vocational school, to cost close to $450,000 with equipment; G. H. Chamberlin, 18 South Broadway, architect.

Beacon Lamps Corporation, 70 Commercial Street, Greenpoint, Brooklyn, manufacturer of electric lighting equipment, etc., is reported planning to rebuild portion of factory destroyed by fire recently, with loss more than $25,000 including equipment. John H. Newman is president.

Merger is being arranged between a group of metal and other furniture plants in New York district, controlled by Irving H. Isaacs and Benjamin Lauterstein, and Albert Pick, Barth & Co., 210 West Randolph Street, Chicago, with combined assets of $30,000,000. Each unit in consolidation will operate independently as in past, under a new central management. Irving H. Isaacs will be president of consolidated company; Ira Krupnick, vice-president; Benjamin Lauterstein, secretary and general manager; and Albert Pick, Jr., treasurer. Plans are under way for expansion in different units.

Kerrigan & Magnuson, 420 Lexington Avenue, New York, architects, have completed plans for a two-story and basement automobile service, repair and garage building, 100 x 175 ft., to cost $100,000 with equipment.

Associated Electric Co., operated by Associated Gas & Electric Co., 61 Broadway, New York, with light and power properties in New York, Pennsylvania, Vermont, Kentucky and other states, has arranged for a bond issue of $20,000,000, a portion of proceeds to be used for expansion and improvements.

Brooklyn Bridge Freezing & Cold Storage Co., 111 Cliff Street, New York, has acquired neighboring property, consisting of a four and a five-story building, to be remodeled for extensions and installation of new equipment. Entire project reported to cost in excess of $350,000.

Structural Gypsum Corporation, 53 Park Place, New York, has plans for a new one-story plant at Linden, N. J., to cost upward of $200,000 with equipment.

Bronx Dumb-Waiter Co., Inc., 1980 Bryant Avenue, New York, has been organized to manufacture automatic self-sustaining dumb waiter machines, metal lined dumb waiter boxes, and all steel dumb waiter boxes and kindred specialties. Plans are under way for erection of manufacturing plant, and company will be in market for materials and equipment.

Lock Joint Pipe Co., 150 Rutledge Avenue, East Orange, N. J., manufacturer of reinforced-concrete sewer pipe, etc., has plans for a two-story addition, 41 x 300 ft., to cost upward of $25,000 with equipment; J. E. Loupley company architect.

Gulf Refining Co., 21 State Street, New York, has purchased three acres at Ridgefield Park, N. J., fronting on Hackensack River, and plans construction of a new oil storage and distributing plant with capacity of 1,000,000 gal., including 250-ft. wharf, machine shop, automobile service and garage building, and other structures, to cost in excess of $200,000 including equipment.

Ovens, power equipment, conveying and other machinery will be installed in a three-story plant, 102 x 275 ft., to be erected by Foerster Baking Co., Bergenfield, N. J., to cost about $125,000. McCormick Co., 41 Park Row, New York, is engineer.

Eastern New Jersey Power Co., 601 Bangs Avenue, Asbury Park, N. J., has awarded general contract to I. R. Taylor & Co., 306 Main Street, for a two-story equipment storage and distributing building, with repair facilities, at Allenhurst, N. J., to cost about $100,000.

Sinclair Crude Oil Purchasing Co., 45 Nassau Street, New York, an interest of Sinclair Consolidated Oil Corporation, same address, operating storage and distributing plants, pipe lines, etc., has arranged for bond issue of $42,000,000, a portion of fund to be used for expansion.

Richardson & Boynton Co., manufacturer of heating equipment, has shut down its plant at Dover, N. J., but

officers of company were not prepared to say whether shutdown is to be permanent or temporary.

Brooklyn Cooperage Co., Georgetown, S. C., is considering rebuilding portion of its local mill destroyed by fire Dec. 3, with loss reported more than $200,000 with machinery. Headquarters are at 55 North Fourth Street, Brooklyn.

New England

BOSTON, Dec. 27.

THE New England machine tool market, so far as it concerns dealers, remains inactive, with little prospect of improvement the remainder of 1927. The betterment noted in other sections of the country has failed to stimulate new prospects in these States, inquiries since the middle of December having fallen to a new low point for the year. The little passing business is the result of old inquiries, mostly for used equipment. The trade, expecting slow sales at this time of the year, has not lost its optimism regarding 1928. The general impression is that 1928 will be better than 1927, with new equipment outselling used.

The call for small tools has fallen to a low ebb. Shops needing small tools evidently are holding down inventories for Jan. 1.

Recent sales include a new Fratt & Whitney No. 2 die sinker to a western Connecticut shop; a used upright drill and a planer to a Quincy, Mass., shop; a small used radial drill to a New Haven company; a used medium sized press to a South Boston plant; a used three spindle drill to a middle Massachusetts plant; a small used lathe to a greater Boston shop, and a new bench lathe running fairly high in cost to a shop, supposedly in the radio apparatus manufacturing field, the location being withheld.

American Saw & Mfg. Co., 67-71 Boylston Street, Springfield, Mass., will shortly start a one-story, 75 x 75 ft., plant addition. Plans are private.

Foundations are in for a one-story plant, 50 x 160 ft., in Newton, Mass., for the N. E. Concrete Pipe Co., 69 Milk Street, Boston. J. E. Hanlon, 80 Boylston Street, Boston, is architect.

Boston Gear Works, 28 Hayward Place, Norfolk Downs, Quincy, Mass., has started work on a three-story, 67 x 95 ft., plant addition. Batty & Gallagher, 13 Temple Street, Quincy, are architects.

Arcade Malleable Iron Co., Worcester, Mass., will shortly be in market for miscellaneous foundry equipment. Details have not been made public.

Super Oil Heating Co., 275 Connecticut Boulevard, Hartford, Conn., compact oil heating apparatus, effective Jan. 1, will be located in a section of plant of Potter & Johnston Machine Co., Pawtucket, R. I. Heating company was organized in 1923 by David B. Roberts, who is president. John Johnston and W. Wallace Potter, Pawtucket, are vice-president and treasurer, respectively.

Edison Electric Illuminating Co., 39 Boylston Street, Boston, has authorized plans for a one-story equipment storage and distributing plant, with repair facilities, including automobile service and garage division, 120 x 125 ft., to cost close to $75,000; Bigelow & Wadsworth, 3 Hamilton Place, architects.

Mayhew Steel Products Co., Shelburne Falls, Mass., plans rebuilding portion of plant destroyed by fire Dec. 17, loss reported at $25,000 including equipment.

Lynn Gas & Electric Co., Lynn, Mass., is arranging an expansion and improvement program in 1928, to cost $1,500,000, including additions in steam-operated electric generating plant and installation of new equipment. A new boiler plant will be built to cost upward of $500,000.

Municipal Transit Department, 1 Beacon Street, Boston, has awarded general contract to White Construction Co., 11 Beacon Street, for a one-story automobile service, repair and garage building, 90 x 190 ft., with boiler plant, at Fields Corner Station, Dorchester, to cost $165,000 with equipment.

Johnson Motor Co., Waukegan, Ill., manufacturer of marine engines, parts, etc., is reported to be planning establishment of branch plant at Guilford, Conn., to cost more than $40,000.

Great Atlantic & Pacific Tea Co., 150 Bay Street, Jersey City, N. J., plans installation of conveying machinery, power and elevating equipment in a five-story storage and distributing plant at Weston Field, Providence, R. I., to cost $450,000.

Public Service Co. of New Hampshire, Manchester, has applied for permission to issue bonds or other securities in amount of about $2,000,000, fund to be used for extensions and improvements in power properties, including acquisition of the Southern New Hampshire Hydro-Electric Corporation and Conway Electric Light & Power Co., operating at Conway, N. H., and vicinity, with expansion in latter territory, including transmission line construction.

Worcester Electric Light Co., Worcester, Mass., has filed plans for extensions and improvements in its power station on Foster Street, to cost about $75,000.

E. H. Hotchkiss Co., Hoyt Street, Norfolk, Conn., manufacturer of snap fasteners, clips, etc., has rejected bids recently received for a two-story addition, 125 x 145 ft., and will have revised plans drawn. It will cost more than $65,000 with equipment. Ballinger Co., 105 South Twelfth Street, Philadelphia, is architect and engineer.

Keyes Fiber Co., Waterville, Me., manufacturer of paper and fiber products, has awarded general contract to Morton C. Tuttle Co., Park Square Building, Boston, for a one-story addition, 88 x 155 ft., to cost in excess of $42,000 with equipment. Portion of structure will be used for laboratory.

Studebaker Sales Co., 109 Brookline Avenue, Boston, has plans for a new service, repair and sales building to cost about $125,000 with equipment.

Philadelphia

PHILADELPHIA, Dec. 27.

BIDS will be received until Jan. 3, by Board of Public Education, Keystone Building, Philadelphia, for pipe and fittings, valves, etc., for school service, per specifications on file; William Dick, secretary and business manager.

Van Sciver Corporation, Twenty-fourth Street, Philadelphia, building materials, sand and gravel, etc., has acquired at public auction for $1,620,000, former bag-loading and power plant of Government at Tullytown, Pa. It consists of 1150 acres and will be developed in part by new owner. Equipment will be installed.

Pennsylvania Electric Welding Co., 416 Vine Street, Philadelphia, has leased property at Spring Garden and Lawrence Streets, for expansion.

Thomas Savill's Sons, 1310 Wallace Street, Philadelphia, manufacturer of plumbing equipment and supplies, has acquired two and four-story factory at North Hancock and Huntingdon Streets, heretofore held by Fred C. Wolstenholme, Inc., textile products, and will remodel for a new plant.

Camden Rail & Harbor Terminal Corporation, Kaighn Avenue and Delaware River, Camden, N. J., Frederick Cohen, head, will soon take bids for a nine-story cold storage and refrigerating plant, consisting of three units, to cost in excess of $2,000,000. Moores & Dunford, 110 East Forty-second Street, New York, architects and engineers. Bids will be called from last noted office.

Department of Supplies, City Hall, Philadelphia, E. J. Lafferty, director, is asking bids until Jan. 3 for crane chain, class 116.

Bureau of Supplies and Accounts, Navy Department, Washington, is asking bids until Jan 3 for socket wrench equipment for Philadelphia Navy Yard, schedule 8271; for 399 oil and water heaters, 220-volt, for aircraft service, for Philadelphia and Boston yards, schedule 8257.

Alvin C. Bieber, 1520 Locust Street, Philadelphia, architect, has plans for a one-story automobile service, repair and garage building, 100 x 100 ft., with two wing extensions, each 75 x 100 ft., to cost close to $100,000 with equipment.

American Gas & Electric Co., 30 Church Street, New York, and its subsidiary, American Electric Power Co., same address, has plans for a new steam-operated electric generating plant on Delaware River, opposite Wilmington, Del., to be known as Deep Water station. Initial plant will have a capacity of 100,000 kw., and ultimately will be equipped for output of 400,000 kw. A steel tower transmission system will be built. Entire project is reported to cost more than $7,000,000. Service will be furnished to Atlantic City Electric Co., Delaware Electric Power Co., and other power utilities from new plant. Stevens & Wood, Inc., 120 Broadway, New York, is engineer in charge of design and construction.

Reading Co., Reading Terminal, Philadelphia, has authorized extensions and improvements in its locomotive and car shops, and engine terminal at Cressona, Pa., to cost in excess of $75,000 with equipment.

Board of Education, Lock Haven, Pa., plans installation of manual training equipment in new three-story high school, to cost $300,000, for which bids will be asked on general contract early in January. Lawrie, Green & Co., Third Street, Harrisburg, Pa., are architects.

Edison Electric Co., Lancaster, Pa., plans extension in facilities, including construction of transmission lines in West Hempfield Township and vicinity.

The Crane Market

NEW inquiry for overhead and locomotive cranes has practically ceased with holidays at hand and very little purchasing is reported. Sizable export sale of locomotive cranes understood made by Industrial-Brownhoist Corporation, which booked total of 21 cranes for South America. Amtorg Trading Co., New York, which purchased several locomotive cranes last spring for Dnieper River power project in Russia, reported about to close on sizable list of additional locomotive cranes. Locomotive crane for Bethlehem Mines Corporation, Bethlehem, Pa. still pending. Crawl-tread locomotive crane for 149th Street yards of Interborough Rapid Transit Co., New York, reported placed with Link-Belt Co.

Among recent purchases are:

State of New York, a 5-ton, 45-ft. span, single I-beam hand power crane reported purchased from Herbert Morris, Inc.

Brooklyn Cooperage Co., Sumter, S. C., a 20-ton used Industrial locomotive crane from the Locomotive Crane Co., Philadelphia.

Lehigh Portland Cement Co., Allentown, Pa., has approved a preferred stock issue of $30,000,000, a portion of fund to be used for expansion.

E. I. du Pont de Nemours & Co., Wilmington, Del., are said to have plans for a new nitrate plant in vicinity of Gibbstown, N. J., comprising several units for ammonia oxidation under new process, to cost more than $400,000 with equipment.

St. Louis

ST. LOUIS, Dec. 27.

PLANS are being prepared by Standard Oil Co., 5301 East Ninth Street, Kansas City, Mo., for a two-story storage and distributing plant, to cost upward of $100,000 with equipment.

Rubber Products, Inc., Topeka, Kan., has acquired a building at Kansas City, Mo., for establishment of new plant to manufacture hard rubber goods, including floorings, etc., to cost close to $30,000 with equipment. F. A. Langhead, president.

Richard W. Grant, 109 North Fifth Street, Beatrice, Neb., architect, has plans for a one-story ice and refrigerating plant at Lincoln, Neb., for M. L. Rawlings, Wymore, Neb., and associates, to cost about $40,000 with equipment.

Muskogee Natural Gas Co., Muskogee, Okla., care of Frank DeMayo, 412 Kansas City Life Building, Kansas City, Mo., recently formed by Mr. DeMayo and associates with capital of $150,000, is said to be planning construction of a new pipe line from Muskogee to Keefetonville, about 13 miles, with compressor station, etc.

City Council, Campbell, Mo., is asking bids until Jan. 10 for a one-story municipal electric light and power plant, to cost aproximately $50,000 with equipment. A. C. Moore, Joplin National Bank Building, Joplin, Mo., is engineer.

Missouri Pacific Railway Co., Railway Exchange Building, St. Louis, is said to be planning extensions in shops and yards at Poplar Bluff, Mo., to cost more than $150,000 with equipment. E. A. Hadley is chief engineer.

Wilson Power & Light Co., Wilson, Ark., is said to have plans for a new steam-operated electric power house and ice-manufacturing plant at West Memphis, Ark., to cost about $80,000 with equipment.

Board of Education, Stromsburg, Neb., is considering installation of manual training equipment in two-story high school, to cost about $150,000, for which plans will be drawn by Meginnis & Schaumberg, Federal Trust Building, Lincoln, Neb., architects.

Simmons Glare Shield Co., Eldon, Mo., manufacturer of automobile lighting equipment, is inquiring for a suitable plant in position to contract for a quantity of metal parts, used in its patented manufactures.

Oklahoma Natural Gas Co., Tulsa, Okla., has purchased gas properties of Oklahoma Gas & Electric Co., operating at Guthrie, Castle, Wagoner, Okla., and vicinity. Expansion is planned, including installation of additional lines. R. C. Sharp is president of purchasing company.

Fort Smith Automotive Supply Co., 7 North Second Street, Fort Smith, Ark., has leased a two-story building on Rogers Avenue, soon to be erected by George Schaffer and associates, for a new works.

Southwestern Bell Telephone Co., St. Louis, has plans for a three-story addition to its equipment storage and distributing plant, to cost approximately $85,000 with mechanical facilities. I. R. Timlin is company architect.

Rogers Iron Works Co., Joplin, Mo., has been organized as consolidation of Joplin plant of United Iron Works, Inc., and Rogers Foundry & Mfg. Co., Joplin. Foundry and machine works of Rogers company, Rogers hard iron foundry and iron works of United company will be operated by new company which will manufacture mine and mill machinery and equipment and conduct, general machinery and foundry business. Offices will be at plant of United Iron Works, Inc., Fourteenth and Joplin Streets.

Chicago

CHICAGO, Dec. 27.

MACHINE tool sales are at the low point of the month. As a whole, however, December purchases are satisfactory, being a trifle below both November and the twelfth month in 1926, but fully up to expectations of the trade as measured by past experiences in the closing months of previous years. Inquiry has not grown in the past week, nevertheless business in prospect is of fair size and dealers look upon the new year with some measure of satisfaction. Agricultural machinery manufacturers, and in particular producers of tractors at Peoria and Moline, Ill., are in need of additional equipment.

Less is now heard of advances in prices and several higher lists, which were to have become effective Dec. 20, have failed to appear.

Reiter Co., Elgin, Ill., manufacturer of water-softening equipment, soot blowers and other power house apparatus, will ask bids in about 30 days for a two-story addition, to cost upward of $35,000 with equipment.

Chicago Wallpaper Mill, Inc., Talman Avenue and Ogden Boulevard, has purchased a two-story building at Hammond, Ind., totaling about 110,000 sq. ft. of floor space, on 4-acre tract, and will remodel for a new mill. Installation will include grounding and rolling machines, electric power equipment, printing machinery, etc., to provide for an output of about 500,000 rolls of paper per month. Project to cost in excess of $100,000.

Decatur Pump Co., North Water Street, Decatur, Ill., is considering construction of a one-story addition, to cost about $25,000 with equipment. W. A. Shorb, president.

Western Silo Co., Ltd., Des Moines, Iowa, manufacturer of silos, tanks, etc., will rebuild portion of its plant recently destroyed by fire, with loss estimated at $50,000 including equipment.

Central Illinois Public Service Co., Springfield, Ill., has arranged for a note issue of $4,200,000, a portion of proceeds to be used for expansion and improvements.

Hudson Mfg. Co., 324 Third Avenue, North, Minneapolis, Minn., manufacturer of garden tools, barn equipment, etc., has superstructure under way on a plant addition at Hastings, Minn., to cost $50,000, for which general contract recently was let to Edward Bjorklund, Builders' Exchange, St. Paul, Minn.

Abingdon Sanitary Mfg. Co., Abingdon, Ill., manufacturer of sanitary ware, is reported planning a two-story addition, estimated to cost upward of $75,000 with equipment.

Utilities Power & Light Corporation, Dubuque, Iowa, has purchased Central States Power & Light Corporation, Davenport, Iowa, and vicinity, with branch plants and systems in several States, valued at $15,000,000. Purchasing company will continue operations as an affiliated organization under Central States name. Arrangements have been made for a bond issue of $8,500,000, and preferred stock issue to total $3,000,000, a portion of proceeds to be used for expansion and improvements. H. C. Orton will be president of corporation.

Met-L-Wood Corporation, 2425 West Fourteenth Street, Chicago, manufacturer of patented bonded steel and wood board products, has engaged Foltz & Co., 510 North Dearborn Street, architects, to prepare plans for a new one-story plant on site recently acquired, totaling about 24,000 sq. ft. of floor space, to cost upward of $65,000 with equipment.

Public Service Co. of Colorado, Denver, Colo., is reported planning a hydroelectric power project in vicinity of Canon City, Colo., with transmission line for service in the Alamosa district, to cost upward of $2,500,000.

Buffalo

BUFFALO, Dec. 27.

PLANS are under consideration by Sinclair Refining Co., 370 Seventh Avenue, New York, for a new oil storage and distributing plant at Wellsville, N. Y., including boiler house, pumping station and other mechanical units, to cost in excess of $350,000 with equipment.

Brockway Motor Truck Corporation, Cortland, N. Y., is negotiating for a merger with Diamond Motor Car Co., 4517 West Twenty-sixth Street, Chicago, and Indiana Truck Corporation, Marion, Ind., with combined assets aggregating $15,000,000. First noted company will be primary factor in consolidation, and Cortland works will be developed as one of main plant units. Other works will be continued in service.

Pennsylvania Railroad, Broad Street Station, Philadelphia, has awarded general contract to Austin Co., for a new one-story equipment storage and distributing works at Olean, N. Y., to cost upward of $50,000.

Board of Education, Trumansburg, N. Y., contemplates installation of manual training equipment in a new high and grade school, to cost in excess of $200,000 with equipment. Carl C. Ade, 89 East Avenue, Rochester, N. Y., is architect, and will soon take bids on general contract.

Niagara, Lockport & Eastern Power Co., Lafayette Building, Buffalo, is planning expansion in vicinity of Salamanca, N. Y., including steel tower transmission lines.

Remington Rand, Inc., will have its general purchasing office in Remington Typewriter Building, East Clark Street, Ilion, N. Y., effective Dec. 27. Office will be in charge of L. Rayburn, director of purchases.

South Atlantic States

BALTIMORE, Dec. 27.

BIDS have been asked by C. Hoffberger & Co., 530-48 East Monument Street, Baltimore, operating ice-manufacturing and cold storage plants, for an 11-story cold storage and refrigerating plant, to cost approximately $750,000 with machinery. J. H. Wickersham, Appel Building, Lancaster, Pa., is architect and engineer.

Apex Mfg. Co., 909 Calvert Building, Baltimore, has leased space in building at 200 North Eleventh Street, for new plant for manufacture of patented razor blades and kindred specialties.

Southern Sash & Door Co., 11 David Street, Greenville, S. C., has plans for a new factory at Charlotte, N. C., for manufacture of sash, doors and other millwork products, to cost more than $75,000 with machinery.

Crown Cork & Seal Co., Inc., Baltimore, has been formed under New York laws to take over and consolidate company of same name, with plant on Guilford Avenue, Baltimore, manufacturer of metal bottle caps, bottle-sealing machinery, etc., and New Process Cork Co., 68 Thirty-fifth Street, Brooklyn, N. Y., manufacturer of kindred products. It is proposed to discontinue production at last noted plant and concentrate manufacture at Baltimore factory. An expansion progrom will be carried out. New company has arranged for a bond issue of $5,500,000, a portion of fund to be used for merger and extensions. Charles E. McManus is president.

Bureau of Yards and Docks, Navy Department, Washington, is asking bids (no closing announced) for a steel water tank, 15 ft. diameter and 20 ft. high, at Parris Island, S. C., specification 5522.

P. C. Painter, city manager, Greensboro, N. C., is asking bids until Jan. 10 for equipment for municipal waterworks extensions and improvements, including addition to boiler and engine plant; two 250-hp. steel case watertube boilers and accessories; steam turbine-driven centrifugal pumps; condenser, waterworks type air pumps and auxiliary oil pumps; oil storage tanks; oil filters; oil coolers; gages, etc. Pumping units to have capacity of 8,000,000 gal. per day.

George N. Ray, 1219 Connecticut Avenue, N. W., Washington, architect, has filed plans for three-story automobile service, repair and garage building, to cost close to $100,000 with equipment.

Sandhill Furniture Corporation, West End, N. C., has taken over a local building and will establish a new plant. Early purchase will be made of wood-working machinery, machine for affixing rail blocks, finishing equipment, tools, etc.

Bureau of Supplies and Accounts, Navy Department, Washington, is asking bids until Jan. 3 for engine lathes for Puget Sound Navy Yard, schedule 8252; Jan 10 for 10,000 steel bilge barrels for Hampton Roads Navy Yard, schedule 8270; and for turbo-generator sets and spare parts for Puget Sound, Mare Island and Brooklyn Navy Yards, schedule 8253.

W. B. Foshay Co., Minneapolis, Minn., operating Public Utilities Consolidated Corporation, has purchased Baker County Power Co., Newton, Ga., including hydroelectric generating plant and transmission lines, valued in excess of $1,300,000. New owner will take over properties at once and plans expansion and betterment program, including additional transmission lines.

Statesville Ice Co., Statesville, N. C., recently organized, is completing plans for erection of new ice-manufacturing plant, to cost more than $50,000 with machinery.

Cleveland

CLEVELAND, Dec. 27.

A LEADING manufacturer of turret lathes has advanced prices 10 per cent effective immediately. In this advance the company is following the lead of manufacturers of several other lines of machine tools who have marked up prices recently. The market has been very dull the past week, sales being limited to a few single tools. Inquiry is exceedingly light. Usually at this season some inquiry comes out for machinery to be purchased after the first of the year, but so far there is very little business in prospect for next month.

Forest City-Wolworth Run Foundries Co., 4500 Euclid Avenue, Cleveland, manufacturer of iron and steel castings, has plans for a two-story foundry, 85 x 100 ft., to cost about $45,000 with equipment.

Container Co., 2604 Albion Street, Toledo, Ohio, manufacturer of paper and other containers, has awarded general contract to Indiana Engineering & Construction Co., Fort Wayne, Ind., for new one-story plant at Van Wert, Ohio, to cost upward of $45,000 with equipment.

Eaton Spring Co., Massillon, Ohio, manufacturer of automobile springs, etc., will rebuild portion of local plant destroyed by fire Dec. 20, with loss close to $50,000 including equipment.

Board of Education, South Avenue, Toledo, is reported planning installation of manual training equipment in new senior high school to cost about $300,000. Edward Gee is architect for board.

Department of Justice, Washington, is securing an appropriation of $100,000 from Congress for purchase of machinery for production of brick, to be installed at Federal Reformatory, Chillicothe, Ohio.

Packard Motor Car Co., 1580 East Grand Boulevard, Detroit, is completing plans for one and two-story service, repair and sales building 115 x 180 ft., at Cleveland, to cost upward of $150,000 with equipment. Albert Kahn, Inc., Marquette Building, Detroit, is architect and engineer.

Detroit

DETROIT, Dec. 27.

JOHN KASURIN, Empire Building, Detroit, architect, has plans for a six-story automobile service, repair and garage building, 63 x 120 ft., at Pontiac, Mich., to cost upward of $175,000 with equipment.

Yellow Truck & Coach Mfg. Co., Pontiac, Mich., is arranging for installation of equipment in its new plant, and will remove its works from West Dickens Avenue, Chicago, to this location. Initial installation will comprise body-building department, to be followed by engine division, major assembling department, frame works, chassis division, body mounting and other departments, forming a complete self-contained unit for taxicab and motor truck production. New works will cost more than $2,000,000. Company is a division of General Motors Corporation, Detroit.

Chrysler Motor Car Corporation, Highland Park, Detroit, has awarded general contract to C. O. Barton Co., Free Press Building, for a one-story addition to its Kercheval body plant to cost more than $75,000. Smith, Hinchman & Grylls, Marquette Building, Detroit, are architects and engineers.

J. M. Gould, Hastings, Mich., representing a paper mill company, name temporarily withheld, is reported negotiating for purchase of plant of Independent Sugar Co., Marine City, Mich., defunct, totaling about 30 acres to be remodeled for early occupancy.

Hudson Motor Car Co., 10617 Knodell Avenue, Detroit, will proceed with a three-story and part basement addition, 80 x 100 ft., for which general contract recently was let to Martin-Krausmann Co., 955 East Jefferson Avenue, to cost in excess of $90,000 with equipment.

General Motors Corporation, Detroit, is planning for the dissolution of its affiliated interest, Saginaw Products Co., and will operate this works in future with several individual

units, to be known as Saginaw Crank Shaft Co., Saginaw Steering Gear Co., and Saginaw Malleable Iron Co., the latter to run the local gray iron foundry and carry out expansion. The foundry will continue as an affiliation of Chevrolet Motor Car Co., Flint. John H. DeWight, president of Saginaw Products Co., for several years, will retire from that office on Jan. 1.

Moisture Valve Corporation, 7753 Hamilton Avenue, Detroit, has been organized to manufacture valves and kindred engineering products. At present company is having parts made in Detroit and assembled at its own plant.

Gulf States

BIRMINGHAM, Dec. 27.

CONSTRUCTION has begun by Texas-Louisiana Power Co., Fort Worth, Tex., on an addition to its steam-operated electric generating plant at Pecos, Tex. Enlargements will be made also in local ice-manufacturing plant. Entire project reported to cost more than $300,000 with machinery.

Atchison, Topeka & Santa Fe Railway Co., 80 East Jackson Boulevard, Chicago, is reported to have plans for new locomotive house and repair shop at San Angelo, Tex., to cost in excess of $45,000 with equipment. C. F. W. Felt is chief engineer.

Florida Power & Light Co., Miami, Fla., has arranged for a bond issue of $10,000,000, a portion of proceeds to be used for extensions and improvements in power plants and system.

Royal Palm Rubber Co., Kelsey City, Fla., has plans for a one-story addition to its mill for manufacture of tires and tubes, to cost about $40,000 with machinery.

Moore Brothers Electric Co., Dallas, Tex., manufacturer of storage batteries and equipment, has leased a new building to be erected on East Commerce Street, for expansion of about 500 battery units per day. It will approximate 11,000 sq. ft. of floor space, and is reported to cost close to $28,000 with machinery. F. J. Woerner & Co., Dallas, architects.

White Eagle Oil & Refining Co., Forth Worth National Bank Building, Fort Worth, Tex., is said to be arranging to rebuild portion of oil storage and distributing plant recently damaged by fire, with loss in excess of $60,000.

United States Engineer, Jacksonville, Fla., is asking bids until Jan. 3, for a quantity of lapwelded suction and discharge pipe, circular 82.

Lone Star Gas Co., Dallas, Tex., operating natural gas properties with total of more than 3000 miles of installed pipe lines, is arranging an expansion and improvement program to cost about $5,000,000, including new lines, compressor stations, etc.

Southern Ice & Utilities Co., Santa Fe Building, Dallas, Tex., has arranged for a note issue of $500,000, portion of proceeds to be used for expansion and betterments.

Southern Ornamental Iron Works, Inc., Arlington, Tex., will soon begin work on a one and two-story addition, 100 x 315 ft., to cost approximately $50,000 with equipment.

Texas Co., Houston, Tex., operating oil properties and refineries, is said to have concluded negotiations for purchase of properties of Pure Oil Co., in western Texas, and contemplates construction of pipe line, 10-in. diameter, about 25 miles long, for oil transmission in that district. Company is also said to be planning construction of pipe line from its oil wells at McCamey to refinery at Perth Arthur, Tex.

City Council, Collier City, Fla., is considering installation of municipal electric light and power plant to cost about $50,000. S. G. Copeland, city engineer.

Indiana

INDIANAPOLIS, Dec. 27.

CITY Council, Huntington, Ind., has plans for a one-story addition to municipal electric light and power house, to cost in excess of $50,000 with equipment; Harry O. Garman, Knights of Pythias Building, Indianapolis, engineer.

Muehlhausen Spring Co., 5841 South Loomis Boulevard, Chicago, manufacturer steel, brass, bronze and other metal springs, has completed erection of new building at Logansport, Ind., cost about $50,000, and will remove to this site, where additional production facilities will be provided.

Fairfield Mfg. Co., Wallace Avenue and Belt Line Railroad, Lafayette, Ind., manufacturer of gears, cutters, etc., has awarded general contract to Anderson & Ulrey, 109 South Twenty-eighth Street, for one-story addition, 80 x 100 ft., to cost approximately $30,000 with equipment.

John A. Shafer, Illinois Building, Indianapolis, engineer, has plans under way for a new hydroelectric generating plant on Paint and Rockyford Creeks, Highland County, Ohio, to cost more than $2,000,000 with transmission lines. It will be built by a company now being organized by M. Irwin Dunlap, Greenfield, and associates.

Southern Indiana Light & Power Co., Columbus, Ind., has acquired property of Winterrowd Electric Co., operating at Flatrock, Ind., and vicinity, and plans extensions in that section, including transmission line construction.

Pittsburgh

PITTSBURGH, Dec. 27.

DECEMBER has produced a fair amount of machine tool business for some dealers, but in general has been no more active than the last month of each year usually is. Inquiries which are mostly for getting prices for budgeting in the early part of next year, continue fairly numerous. As a whole, 1927 was not a prosperous year for Pittsburgh dealers, who did fairly well in the early months, but suffered with the general recession in the steel business which began in May.

Officials of Atlantic Aircraft Corporation, Hasbrouck Heights, N. J., headed by Anthony H. G. Fokker and Major Lorillard Spencer, have organized the Fokker Aircraft Corporation, with capital of $1,000,000, to construct and operate a new plant at Glendale, near Wheeling, where large property has been secured. Plans have been approved for initial unit to approximate 100,000 sq. ft. of space, to cost in excess of $300,000. Plant will be given over to production of tri-motored and other aircraft, with assembling division. It is purposed to continue operations at the Hasbrouck Heights plant largely for experimental work. Mr. Spencer will be president of new company, and Mr. Fokker, engineer and chief designer.

Joseph Greenspon's Sons Iron & Steel Co., Hall Street, St. Louis, manufacturer of iron and steel products for mine service, braces, etc., with iron and steel scrap division, has asked bids on general contract for one-story branch plant at McKee's Rocks, Pa., to cost upward of $90,000. Considerable portion of works will be used as a pipe shop.

Carnegie Steel Co., Carnegie Building, Pittsburgh, has plans for a one-story general repair shop at Homestead, Pa., portion of works to be given over to a locomotive repair shop. It is estimated to cost more than $85,000 with equipment; S. Dillon, chief engineer.

Monongahela-West Penn Public Service Co., West Penn Building, Pittsburgh, is concluding negotiations for purchase of Webster Springs Electric Light Co., Webster Springs, W. Va., and plans expansion, including transmission line construction.

Industrial Equipment Corporation, Carnegie, Pa., has been organized to buy used machinery and equipment. L. A. Green, formerly of L. A. Green Railway Equipment Co., is manager of company.

Milwaukee

MILWAUKEE, Dec. 25.

MACHINE-TOOL plants are closing the year in much better position than had been expected, and with prospects considerably better than a year ago. While business is not unusually active, both inquiry and sales this month are exceeding the promise by a substantial margin. Inquiry among automotive plants is favorable once more, although it is doubtful if the bulk of pending requirements will be placed before January, or until needs on the basis of the spring production schedules have become more definitely settled. The interest exhibited by the railroads is also encouraging.

Unit Corporation of America, Milwaukee, has been incorporated in Delaware to effect a merger of Obenberger Forge Co., Fifty-third Avenue and Burnham Street, West Allis, and the Dallmann Machine & Mfg. Co., 901-935 Winnebago Street, Milwaukee, both manufacturing drop forgings, transmission gears and attachments for tractors. Soon after Jan. 1, another Wisconsin company engaged in kindred lines, and a Michigan gas engine manufacturer are to enter the same merger. W. H. Schmidt, president of Dallmann company, become president of the Unit Corporation. E. W. Edwards is vice-president; P. O. Dallmann, secretary, and George C. Moerschel, treasurer.

Common Council, Manitowoc, Wis., has authorized purchase of a site for a new South Side junior high school and vocational training institute and will shortly select an architect. Project involves an investment of about $300,000.

Morain Gravel Co., Plymouth, Wis., will invest approximately $40,000 in reconstruction and re-equipment of its stone and gravel plant at Glenbeulah, Sheboygan County, and will also purchase a new gasoline locomotive early in the spring.

Village Board, Osseo, Wis., expects to ask bids about Jan. 15 for construction and equipment of a municipal waterworks and sewage plant and system to cost $100,000. Contracts have been let for drilling well. Plans are being completed by Druar & Millinowski, consulting engineers, 500 Globe Building, St. Paul, Minn. Requirements include a deep well pump, motor driven with automatic control; mains, hydrants, etc. J. W. Smith is village clerk.

Natural Ice Co., Milwaukee, a new corporation, has engaged A. H. Siewert, architect and engineer, 805 Thirty-sixth Street, local, to design a new artificial ice plant and warehouse. Complete equipment will be required. Bids on building will be taken about March 1.

Felker Brothers Mfg. Co., Marshfield, Wis., manufacturer of tanks, boilers, heaters, etc., has increased its capital stock from $150,000 to $200,000. Company has been enlarging its works and is still buying equipment.

Random Ice & Coal Co., 964 Locust Street, Milwaukee, will build an artificial ice producer plant and warehouse in West Allis, costing about $50,000. K-W Construction Co., Inc., 589 Mabbett Avenue, Milwaukee, has general contract.

Cincinnati

CINCINNATI, Dec. 27.

DECEMBER has brought a fair amount of business to local machine tool builders, and from a sales standpoint the month will compare favorably with November. As the year draws to a close manufacturers estimate that bookings in 1927 will be from 80 to 85 per cent of those in 1926. Machine tool shipments, on the other hand, have closely paralleled those of previous year and in some cases an increase of as much as 20 per cent has been realized. The improvement in respect to shipments is explained by the fact that builders on Jan. 1, 1927, had a substantial number of unfilled orders, whereas they are entering 1928 with considerably less work ahead of them than a year ago.

In the past 12 months the automobile industry yielded far less business than in 1926, and some companies go so far as to say that buying in the Detroit district was in the smallest volume since 1920. Railroads again proved to be disappointing as a source for orders, their purchases in the aggregate having been unimportant. It is from the general industrial field, represented by metal-working plants in a diversity of industries, that machine tool manufacturers have obtained the bulk of their business. With a few companies European and South American orders contributed a considerable percentage of their total sales.

Some planer builders have raised prices and have succeeded in booking several good orders before the advance became effective. A company in California has contracted with a Cincinnati lathe builder for six machines, while a company in Germany has bought a like number of special lathes. The Norfolk & Western has continued its purchases, which probably will not be completed before the end of the year. Included in the tools already ordered are two radial drills from a local manufacturer.

Ohio Fuel & Gas. Co., Cincinnati, operated by Columbia Gas & Electric Co., same city, has applied for permission to purchase Empire Gas & Fuel Co., Wooster, Ohio; Atlas Chemical Co., Toledo, Ohio; oil and gas properties of Ohio Public Service Co., Cleveland, and other utilities, totaling in all $11,000,000. Plans are under way for expansion in different territories, including pipe line construction.

Air Corps, Material Division, Wright Field, Dayton, is asking bids until Jan. 10 for eight bumper assemblies, 100 batton assemblies and other airplane parts, circular 172; until Jan. 6, for 2 propeller assemblies, solid aluminum, alloy blade, split hub, for Liberty engine, circular 179; and until Jan. 11, for 1000 valves, Liberty engine exhaust, circular 182.

Tennessee Electric Power Co., Chattanooga, Tenn., is said to be arranging an expansion and improvement program in 1928 to cost about $5,000,000, including extensions in steam-operated and hydroelectric power plants at Hale's Bar, and other power station developments, transmission line construction, etc.

Red Gulf Cedar Co., Lebanon, Tenn., will rebuild its cedar oil distilling plant and boiler house recently destroyed by fire, with loss of more than $40,000 including equipment.

Capitol Hardwood Co., 344 Dublin Avenue, Columbus, Ohio, is reported planning early purchase of woodworking tools and machinery to replace equipment recently destroyed by fire.

Pacific Coast

SAN FRANCISCO, Dec. 21.

PLANS are being prepared by Union Ice Co., 354 Pine Street, San Francisco, for a new ice-manufacturing and cold storage plant at Oakdale, Cal., to cost $55,000 with equipment.

Western Concrete Pipe Co., Los Angeles, has approved plans for a new plant at Phoenix, Ariz., to cost approximately $100,000 with machinery.

Brunswick-Balke-Collender Co., 629 South Wabash Avenue, Chicago, manufacturer of talking machines, billiard tables, etc., has plans for a one-story factory at Los Angeles, 178 x 400 ft., to cost in excess of $150,000 with machinery. Local offices at 84 South Los Angeles Street. J. Thomas Payne, Western Mutual Life Building, Los Angeles, and George W. Harding, San Diego, Cal., are associated architects.

Western Aero Construction Co., Jeneven Building, San Bruno, Cal., has plans under way for a new one-story plant for aircraft manufacture, to cost $40,000 with equipment.

Kroehler Furniture Mfg. Co., Charter Oak and Gillman Avenues, San Francisco, has awarded general contract to Black & Campbell, Call Building, for a one-story addition to cost upward of $50,000 with equipment.

Water and Power Commission, 207 South Broadway, Los Angeles, is asking bids until Jan. 6 for electric wire and cable, specification P-475.

Northwest Mineral Products Co., 205 French Building, Tacoma, Wash., has plans for a one-story refinery for production of silica quartz, silica sand, foundry sand, and kindred products.

City Council, Eugene, Ore., has plans for a municipal hydroelectric power development, with initial capacity of 18,000 hp., to cost $2,200,000 with power dam and transmission system. Bonds have been approved. It is expected to ask bids in the spring. Steven & Koon, Spalding Building, Portland, are engineers.

Bunting Iron Works, 820 Parker Avenue, Berkeley, Cal., has plans for a one-story works to cost close to $25,000 with equipment.

J. I. Doherty and V. E. Pagh, Burbank, Cal., will build a new one-story ice-manufacturing plant to cost about $25,000 with equipment. It will include a one-story engine plant.

Board of Education, Oakland, Cal., will ask bids on general contract in about 60 days for a one-story vocational shop at local high school, to cost $60,000 with equipment. Plans are being drawn by architectural department of board, building and grounds division.

Canada

TORONTO, Dec. 27.

THE holiday season has had an effect on machine tool sales the past week. While it is understood that a number of buyers are in need of equipment, most of them are now holding up orders until after the first of the year when dealers and builders look for a continuation of the strong demand that featured this market during 1927.

Tenders are being called by Saskatchewan Pool Elevators, subsidiary of Saskatchewan Wheat Producers, Ltd., Regina, Sask., for construction of a terminal elevator at Port Arthur, Ont., with capacity of 6,000,000 bu. Work will start in spring.

Quinlan, Robertson & Janin, Ltd., 702 Sherbrooke Street, Montreal, are applying for a permit to install a 50-hp. steam boiler, four electric motors of 100 hp., etc.

Richards-Wilcox Canadian Co., Ltd., Chelsea Green, London, Ont., manufacturer of builders' hardware, fire doors, iron and steel products, etc., will start work soon on an addition to cost $50,000.

Canada Crushed Stone Co., Ltd., Sun Life Building, Hamilton, Ont., is completing arrangements for erection of a plant at Puslinch, Ont.

Panther Rubber Co., Sherbrooke, Que., will build a $20,000 addition to its plant, two stories, 32 x 160 ft. Stewart Construction Co., 12 Wellington Street North,

Sherbrooke, has general contract; architects, Schein & Levine, 811 Pemberton Building, Boston.

Ottawa Power Co., 86 Wellington Street, Ottawa, Ont., is completing arrangements for installation of an additional unit to its power development plant at Bryson, Que.

C. D. Howe & Co., Port Arthur, Ont., and Vancouver, B. C., are preparing plans for a grain elevator and wharf at Liverpool, B. C., to cost $700,000, for the New Westminster, B. C., Harbor Board. Tenders will be called next month.

Foreign

OFFICIALS of India Tire & Rubber Co., Akron, Ohio, have formed a subsidiary in Great Britain, with capital of £150,000 (about $750,000), to construct and operate a new plant in Scotland. Tract of 65 acres has been purchased and work on project will soon begin. It is estimated to cost close to $250,000 with equipment, and will be ready for service in 1928.

Hoskins Iron & Steel Co., Ltd., Eskbank Works, Lithgow, New South Wales, Australia, has approved plans for a new iron and steel works, including fabricating division, etc., in Port Kembla district, consisting of several units with capacity for handling about 100,000 tons of iron ore per annum, to cost upward of $9,500,000 with equipment. Main unit will be 27 x 1800 ft. American Consulate, Sydney, Australia, E. C. Squire, trade commissioner, has information on project.

Palestine Electric Corporation, Ltd., Tel-Aviv, Palestine, Egypt, is completing arrangements for construction of a hydroelectric generating plant on Jordan River, with power dam in vicinity of Lake Tiberias and generating station near Adadieh. A transmission line will be built to operate at 66,000 volts. Company has secured exclusive concession for project, as well as construction of other hydroelectric generating plants on Yarmuk River and transmission lines, with installation of electrically-operated pumping plants for irrigation service and other power facilities. Project is designated as Rutenberg plan, and is estimated to cost $4,500,000. American Consulate, Cairo, Egypt, James F. Hodgson, commercial attaché, has information regarding enterprise.

Stockholms Superfosfat Fabrik Aktb, Stockholm, Sweden, capitalized at $4,000,000, manufacturer of chemicals, etc., plans construction of a new electrically-operated unit at its works at Stallbacka, for production of synthetic vinegar, to cost more than $400,000 with machinery.

NEW TRADE PUBLICATIONS

Automatic Machinery.—Baird Machine Co., Bridgeport, Conn. Bulletin dealing briefly with regular four slide machines for wire and ribbon metal articles, spring making machines, automatic presses and ball burnishing machines.

Ventilating Equipment.—Lakeside Co., Hermansville, Mich. Bulletin 30-D, providing brief descriptions with illustrations and specifications of the company's ventilating units. Various features of the system are emphasized, particularly the four-way air deflector, the specially designed impeller and the silent tex-rope drive.

Rust Prevention.—American Rolling Mill Co., Middletown, Ohio. Bulletin entitled "Light on Your Rust Problems," by D. M. Strickland, research engineer, which is designed to bring out the advantages of Armco ingot iron in preventing rust.

Heat Insulation.—Philip Carey Co., Cincinnati. Bulletin 101A of 44 pages is devoted to heat insulation for temperatures from 500 to 1200 deg. Fahr. It is well illustrated and contains considerable tabular matter, showing the effects of providing adequate insulation for steam pipes and detailing heat losses under varying conditions.

Electric Controlling Apparatus.—Allen-Bradley Co., Milwaukee. Folder of four pages illustrating and describing control apparatus in a wide variety of industrial uses.

Metal-Working Machinery.—Torrington Mfg. Co., Torrington, Conn. Folder listing a great variety of machines for metal-working plants, made by this company. Photographs and detailed specifications will be furnished on application.

Pressed Metal Parts.—Youngstown Pressed Steel Co., Warren, Ohio. Booklet of 24 pages illustrating and describing a large variety of equipment made of pressed sheet steel or other metals, designed to take the place of similar parts made of wood or of cast metal. The illustrations show applications of these parts.

Steam Turbines.—Terry Steam Turbine Co., Hartford, Conn. Bulletin of 40 pages illustrating and describing the Terry turbine and showing its application in a wide variety of industrial uses. This turbine is made in sizes up to 400 hp. or more, and is used not only for pumps and electric generators, but also for drive of many types of machinery.

Grinding and Polishing Machinery.—Bridgeport Safety Emery Wheel Co., Inc., Bridgeport, Conn. Loose-leaf catalog of 52 pages, describing and illustrating grinding wheels and grinding and polishing machinery, including heavy-duty face grinders with hydraulic table drive as well as other types of face grinders; belt and motor-driven floor grinders, drill, tool, swing frame and radial grinders.

High-Temperature Insulation.—Celite Products Co., 1320 South Hope Street, Los Angeles, Cal. Reprint of a lecture given before numerous engineering colleges, containing data on heat transfer through various furnace settings, and drawings indicating proper methods of building insulating materials into such brickwork.

Induction Motors.—Wagner Electric Corporation, 6400 Plymouth Avenue, St. Louis. Bulletin 153, dealing with the type 58RB split-phase induction motor of ⅛, ⅙ and ¼ hp. Construction and operation features of the motor are graphically treated with particular emphasis on the quick-break switch.

Angle Compressors.—Sullivan Machinery Co., 122 South Michigan Avenue, Chicago. Bulletin 83-G, describing the new line of Sullivan high pressure angle compound compressors, class WJ-3, suitable for pressures from 250 to 1000 lb. per sq. in. The units have been especially designed for use in high pressure gas and air lift work in oil fields.

Electric Ovens.—Young Brothers Co., 6500 Mack Avenue, Detroit. Well illustrated booket dealing with the various types of ovens developed by the company for use in the electrical industry. Among the various materials treated are insulating materials, enameled wire, molded insulation, armatures, etc. There are also discussions of oven construction, heating and ventilating, loading methods and baking as an economic practice.

Ventilating Equipment.—American Blower Co., Detroit. Booklet devoted to the Venturafin method of heating and ventilating as applied by the Austin Co. in the Oakland-Pontiac plant. Various piping details are included and details of the installation are included.

Heat Treatment.—Stanley P. Rockwell, Hartford, Conn. A 20-page pamphlet entitled "Rockwell Dilatometers for the Volcrit Method of Heat Treatment" has recently been issued. It is well illustrated and describes fully the various advantages in the use of this particular apparatus.

Heat Treatment Control.—Brown Instrument Co., Philadelphia. "Eliminate the Human Factor" is the title of a folder just issued by this company, containing pictures and captions showing 13 different applications of the company's automatic temperature and pressure controls in an equal number of industries.

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